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CHARLES ELMORE CRO
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IN THE

Supreme Court of the United States

OCTOBER TERM, 1930.

No. 14 Original.

THE UNITED STATES OF AMERICA, *Complainant*,

v.

THE STATE OF UTAH, *Defendant*.

DEFENDANT'S REPLY BRIEF.

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DEFENDANT'S REPLY BRIEF.

In the Report of the Special Master, and also in defendant's brief supporting its exceptions filed herein, the nature of the case and substance of the matters in controversy are sufficiently stated.

In discussing complainant's contentions in support of its exceptions to the Report of the Special Master, we shall, as nearly as practicable, follow the order adopted in complainant's brief.

(Unless otherwise indicated the italics appearing in this brief are ours.)

EARLY NAVIGATION.

Twenty-six pages of complainant's brief are devoted to a discussion of the alleged significant fact that from the date of the first Spanish explorers to the time when Utah was admitted into the Union, as well as thereafter, travel to California was not via the Colorado River.

Major Powell made his expeditions between 1869 and 1872. An inscription on the rocks at one point in Cataract Canyon suggests the probability that one F. H. Wright went through that canyon in 1876. However, Major Powell is the first man to record the events of any journey through Cataract Canyon or through Marble or Grand Canyons below. Although the course of the stream below Black Canyon was earlier known and the Grand and Green Rivers had before then been discovered and their approximate course determined, no one before Powell knew anything concerning river characteristics or navigable capacity of the Colorado between Lees Ferry and Black Canyon, and if Mr. Wright went through Cataract Canyon, he left no record to supplement that of Major Powell concerning river characteristics or navigable capacity along that stretch. Before Major Powell's expeditions and long before the information gathered by him was known to the world, the Union Pacific and Central Pacific Railroads had been completed. Early travelers coming upon the rivers in Utah would be able to observe that they ran southerly, and if their destination was California, would have no reason to abandon their horses and wagons and set out on a boat journey, even had they possessed materials with which to build a boat. If they

had known the course of the Colorado River and had they been willing to act upon the assumption that it was navigable, their objective was not the Gulf of California or southern California. They would have continued on with their wagons, live stock and other equipment so necessary to them in building their new homes. The trek to California did not assume any very considerable proportions until after the discovery of gold in 1849, and it was not until a very much later period when substantial migration commenced to the extreme south end of that State. The early day traveler could have had no purpose in navigating the Colorado River to the Gulf or to that vicinity, and there commence another overland journey of hundreds of miles northerly to his objective.

However, all that has been said by complainant with reference to non-use of the Colorado River by the Mormons or by travelers, merchants or others, in going to and from California, is sufficiently answered by the pleadings in this case. Complainant asserts and defendant admits that none of the rivers in controversy is navigable in interstate commerce. Complainant introduced many exhibits in evidence, in addition to the reports of Major Powell, relative to the rapids and other river characteristics in Marble and Grand Canyons, upon which exhibits, together with other information in its possession, it doubtless bases its claim that the river is not navigable between states, either in law or in fact. Complainant directs special attention to a statement found in certain exhibits that the foot of Black Canyon in Arizona is a point above which boats could not be taken "now or at any time".

In defendant's brief before the Master, it did not

contend that the Colorado River was or is navigable in fact along that stretch in Cataract Canyon where the rapids exist. We have filed no exception to the Report of the Special Master, finding that the Colorado River is not navigable in law or in fact between Mile 176 above Lees Ferry and Mile 212.15 above Lees Ferry, the last mentioned point being at the first cataract encountered by one traveling downstream from the confluence of the Green and Grand Rivers.

Under the pleadings herein and in view of the facts above indicated, we are somewhat at a loss to understand why complainant devotes more than one-fourth of its brief to a recital of the evidence and to a discussion of the alleged significance of evidence that early travelers did not accomplish their journeys to and from California in boats upon the Colorado River.

At many other places in its brief, complainant comments upon what it deems an extraordinary fact, to wit, that Stanton and others, desiring to convey supplies and heavy, expensive machinery to points on the Colorado below Mile 176 above Lees Ferry, hauled such freight overland to some point on the river below the cataracts, and thence in boats to destination. The fact is stressed that Governor Dern of Utah did not elect to take the perilous trip through Cataract Canyon and preferred to travel overland to North Wash in order that he might enjoy the delightful journey described by him over the strip of river below Cataract Canyon which the Master finds to be navigable.

Until a few months ago when a bridge was built across the Colorado River at Lees Ferry, one desiring to drive from Salt Lake City or any other Utah

point to Phoenix, Arizona, was compelled to go hundreds of miles southwesterly and then return easterly in order to accomplish the journey. At that same time there was an excellent road from Utah points to the Union Pacific Lodge on the north rim of Grand Canyon. Thirteen miles on an air line across the canyon was El Tovar, served by the Santa Fe Railroad and also by an excellent highway leading directly to Phoenix. If this small thirteen-mile gap could have been bridged, hundreds of miles of desert travel might have been avoided. However, the fact that in going to Phoenix, travelers did not use the road to the Union Pacific Lodge, or that one desiring to travel from Phoenix to Salt Lake City did not use the excellent highway to El Tovar, in no degree indicated that either highway was defective or that it was not used or susceptible of being used in trade and travel.

In this connection, we anticipated the argument orally urged by complainant before the Special Master that the Colorado River and its tributaries must be treated as a single entity, and if non-navigable in part, could not in law be deemed navigable in other parts. We observe no such argument in its brief filed in this Court, and in the absence of such contention, are at a loss to understand complainant's purpose in devoting more than one-fourth of its brief to this subject.

A glance at the map of Utah fully explains why the sections of the river found by the Special Master to be navigable, were not used by the Mormons in traveling between their settlements. The simple answer is that the settlements and the rivers were in different localities. There are only three towns in the

vicinity of any section of river here involved: the Mormon town of Bluff, located on the San Juan, which river was held by the Special Master to be non-navigable; the largely Mormon settlement of Moab located on what was formerly called Grand River; and the town of Green River on the Green River. The record discloses river travel between the two last mentioned towns, notwithstanding the comparatively short overland distance between them. Use of the rivers in trade and travel between any other of the towns in Utah would involve an overland trip to and from the river aggregating a much greater land journey than a direct overland trip to such town. However, mere distance in miles does not fully tell the story. It will be observed by looking at the map that the Mormon settlements occur generally at intervals north and south along the central portion of the state. Distances between them are not great, and naturally the good roads and general line of travel were in that locality. We can see not the slightest significance in the failure of the Mormons to make an unnecessary detour from their line of travel between settlements merely for the purpose of riding on a boat along some portion of the rivers and then leaving the boat and driving back inland to a settlement. Even had there been no obstruction to upstream navigation on the San Juan River, it would have been quite extraordinary for a traveler to drive across country with his outfit to the Colorado River at the mouth of the San Juan and there leave his team and wagon and proceed on to Bluff via boat. These men were farmers and colonists; they did not take trips for mere sight-seeing purposes, and wherever they went they took with them their live stock

and such equipment as was vitally necessary in going forward with their agricultural pursuits.

We respectfully submit that the conclusion of the Special Master, appearing on pages 51-2 of his Report that non-use of the rivers by the Mormons and by those journeying to and from California is of no significance and creates no presumption of non-navigability, is manifestly sound.

Later in the brief we shall discuss some of the other matters referred to by complainant in its argument under this title, including the matter of navigation along the stretches of rivers here involved and also the matter of alleged "head of navigation" at the foot of Black Canyon.

THE LAW DEFINING NAVIGABLE RIVERS.

Complainant expresses complete accord with Mr. Justice Field's statement in *The Daniel Ball* that rivers navigable in fact, are navigable in law and that "they are navigable in fact when they are used, or are susceptible of being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water." Complainant also recognizes the controlling authority of The Montello wherein this Court says that the "*capability* of use by the public for purposes of transportation and commerce affords the true criterion of the navigability of a river, rather than the *extent* and *manner* of that use. If it be capable in its natural state of being used for purposes of commerce, no matter in what mode the commerce may be conducted, it is navigable in fact, and becomes in law a public river or highway. *Vessels of any kind that can float upon the*

water, whether propelled by animal power, by the wind, or by the agency of steam, are, or may become, the mode by which a vast commerce can be conducted, and it would be a mischievous rule that would exclude either in determining the navigability of a river."

Complainant seeks to avoid this clear and unambiguous statement of the law in *The Daniel Ball* and in succeeding cases by construing cases like *United States v. Rio Grande Dam & Irrigation Co.*, 174 U. S. 690, and *Oklahoma v. Texas*, 258 U. S. 574, as in effect holding that in order to be navigable actual use of a river in commerce must be frequent; that if the navigation of a river is only occasional, it is not navigable. An analysis of those cases will disclose that they stand for no such proposition. As construed by complainant the words "or susceptible of being used," which are always found in this Court's definition of navigability, are surplusage and utterly meaningless. An analysis of any decision rendered by this Court, wherein a river has been declared non-navigable because of the nature of its use in commerce, will reveal that such conclusion was based upon the fact that the river's *susceptibility* to such use was "exceptional" or only "occasional."

It would appear to be complainant's contention that these rivers have not been navigated to the extent or in the manner or by the type of water craft necessary in order to meet the criterion of navigability established in the decided cases.

Complainant would supplement the test of navigability as uniformly announced by this Court by various other additions and amendments that will be later noted in this brief. Among the amendments offered is the contention that it must definitely ap-

pear that the alleged navigable water will in the future be a valuable and substantial channel of commerce. If such contention has any merit the Court went far astray in deciding *United States v. Holt State Bank*, 270 U. S. 49, where it appeared that Mud Lake, the bed of which was in controversy, had been completely drained long before suit was commenced.

Annexed to this brief is an Appendix briefly outlining the testimony of the witnesses who related their experiences in navigating the rivers. Obviously their entire testimony comprising over fifty-five hundred pages of typewritten matter cannot be thus briefly abstracted, but we believe that our Appendix fairly reflects the substance of the testimony touching actual navigation and all difficulties encountered by those who used these streams as highways for trade and travel. In the body of the brief we shall later make specific reference to evidence concerning alleged impediments to navigation, made the basis of various exceptions filed by complainant to the Report of the Special Master.

We earnestly contend that the evidence conclusively establishes that the areas found to be navigable by the Special Master, are navigable in fact and in law, and that he had no alternative other than to arrive at the conclusions expressed in his Report with respect to those areas. All tests of navigability heretofore fixed by this Court have been fully met.

The Appendix to complainant's brief herein contains what purports to be a digest of portions of the testimony of certain witnesses in the Red River and other cases. We have not examined the transcript of the record in those cases and therefore are not advised as to what portion of the testimony of any

witness is contained in complainant's Appendix, nor as to what facts may have been related by other witnesses appearing in those cases. We are aware of no manner of determining which of the witnesses or what part of any testimony was believed or considered unworthy of credence by the Court. It definitely appears in *Oklahoma v. Texas,* 258 U. S. 574, that the Court utterly rejected certain evidence received in support of the claim of navigability. The facts upon which its decision is based are clearly stated in the opinion and it is now wholly immaterial whether the assumed facts were or were not the actual facts.

In *Utah Consol. Mining Co. v. Utah Apex Mining Co.,* 285 Fed. 249 (8th C. C. A.), where appellant sought to bring to the attention of the court facts that had been detailed by witnesses in the so-called Lawson case, in which the nature of the same limestone bed in controversy had been adjudicated, the court said at page 256:

> "Every opinion must be read in connection with all that is said in it, and the controlling principles of law which it announces *are applied to the facts found within its four corners.* In no other way is it an authority than on facts analogous to those found in it."

In his opening statement (R. 1-24, Vol. 1) the able counsel for complainant briefly mentioned the case of *Oklahoma v. Texas,* 258 U. S. 574, but the only decision from which he quoted was *Harrison v. Fite,* 148 Fed. 781. From the beginning it has appeared that complainant's case is built around certain gen-

eral language employed by Judge Hook in that case. We shall therefore begin with that case and endeavor to analyze its real meaning.

In *Harrison et al., v. Fite, et al.*, 148 Fed. 781, Complainants as officers and trustees of a voluntary association known as the "Big Lake Shooting Club," asked for an injunction restraining defendants, most of whom were averred to be market hunters and fisherman, from trespassing upon what was alleged to be the property of the Club. It was admitted that complainants as trustees for their Club held title to the riparian lands abutting on the meander line of what was known as "Big Lake." Their deeds also purported to convey to them as accretions the lands lying within the lines to the thread of Little River. Defendants claimed that Big Lake was a part of Little River and contained various navigable channels, and that Little River was a navigable stream. In the very first paragraph of the opinion, as a premise of the decision that follows, Judge Hook announces (page 783) that whether waters are navigable or unnavigable "the question whether the title to the soil under the waters passes to the grantee of the shore land is determined by the law of the state where the land lies." It has not been our understanding that complainant desires to have the foregoing statement of the law applied in the case at bar.

In the second paragraph of the opinion he states that in Arkansas, where Big Lake was located, "a riparian owner takes all accretions, whether the water course be navigable or not." He then cites Arkansas cases in support of the proposition that although title to the bed of a navigable stream in Arkansas is in the state, the bed "does not extend to or include that

upon which *grasses, shrubs,* and *trees* grow, though covered by the great annual rises."

At page 785, after referring to the conflicting evidence relative to alleged former navigation of Big Lake, Judge Hook says:

> "Whatever may have once been the capacity and utility of the body of water known as 'Big Lake' as a highway of commerce or in the floatage of the products of the fields and forests along its banks, *the conditions that are to be considered are those of recent years and the present.*"

The law of Arkansas as announced in the last quoted language is, of course, in irreconcilable conflict with the rule applicable in the case at bar and in the *Economy Light and Power Company* and *Holt State Bank* cases.

At page 786, after stating that "During the greater part of the year the bed of the lake appears to view, excepting where the deeper depressions allow the waters to stand in scattered pools;" that extensive *fields of grass* are present upon which livestock run for several months of the year; that vehicles are driven over the dry bed and roads over the bed are worked on by citizens; that *dead trees* and *stumps* still show the effects of a fire that ravaged the lake basin more than thirty years ago, the court (obviously having in mind the law of Arkansas as to what constitutes the bed of a body of water and the law of that state with reference to accretions) says:

> "The evidence fully justifies the finding that that part of the area indicated upon the maps and exhibits as being the bed of Big Lake, which extends from the eastern meandered line westward

to the east line of Little river, has *by process of accretion and the reliction of the waters, become a part of the patented lands* along the eastern margin."

From the facts assumed by Judge Hook in arriving at his conclusion, it is apparent that if Big Lake was navigable during any period of the year its *susceptibility* to such navigation was only *occasional*. With reference to Little River, it appeared that even in high water it could only be successfully navigated, during recent years, in very light craft drawing only a few inches of water.

It is true that this case has been cited once, and so far as we have been able to discover once only, by this Court. In *Oklahoma v. Texas*, 258 U. S. 574, it is cited in a footnote at the bottom of page 591 for the proposition that to be navigable a stream must be either used or susceptible of being used as a highway for commerce and that if such use or susceptibility for such use is "exceptional, and confined to the irregular and short periods of temporary high water" it is not navigable in law.

In *Harrison v. Fite, supra*, as in two or three other cases relied upon by Complainant, the fact that there was no "public" terminus within the area in controversy was doubtless considered to be an additional reason for denying navigability. We find great conflict in state court decisions as to whether or not the existence of such public terminus is essential. We do not believe this Court has ever passed on that question and, so far as we have been able to find, complainant has cited all federal court decisions, except one, in which the existence or non-existence of a

public terminus, as a factor in arriving at navigability in law, has been considered. In *Harrison v. Fite* complainant owned the riparian land. Judge Hook there says, "To be navigable a water course must have a useful capacity as a *public* highway of transportation," and that in order to subject water to a "public" servitude mere depth of water or the fact that there might be pleasure boating thereon or that hunters or fishermen might float their skiffs or canoes thereon is not sufficient.

In *North American Dredging Co. v. Mintzer*, 245 Fed. 297, plaintiffs sought to restrain the Dredging Company from operating a dredge and removing dirt through their land. It appears that about 500 acres of salt marsh or tideland had been acquired by plaintiffs' grandfather by grant from those holding title under the state Tideland Act. When title to this marsh land was acquired and for years thereafter, it was used largely for farming and grazing. Years before, plaintiffs' grandfather had built a dike to keep out the tide and render the land more available for pasturage. After 1901 this dike was permitted to become out of repair and sea water flooded the land at high tide. However, there was a channel "varying with the tide from 2 feet or less at low tide in its shallowest parts" to 7 or 8 feet at flood. The Standard Oil Company acquired by grant a part of this 500 acres and in order to reach their premises wished to deepen this channel so that it could be navigated. At page 300 the court says:

> "The court found that it was only after the Oil Company had established its works that any effort was made to navigate the channel by craft

> or burden; that occasionally power boats and *scows of light draft* have been taken up *through San Pablo creek* into the channel involved, *on the flood tide, but that it was impracticable to put the channel to such use without deepening it for the purpose.*"

It thus appears that the public had no interest or concern whatsoever in this small channel which the Oil Company desired to improve and make navigable for its own purposes, and no terminus there existed to which the public would have the right to go or where they would have a right to land without being guilty of trespass. In the lower court (242 Fed. 553) District Judge Van Fleet called attention to the fact that the legal title to the land in question "including the soil under the channel itself," which the Oil Company demanded the right to remove, was in plaintiffs and that defendant had not challenged such title; that title had come to plaintiffs' grandfather in the early 70's by grant from former owners under state patent. At page 559 Judge Van Fleet says:

> "This is largely a question of fact, to be determined from the character of the stream, *its situation and availability* as a highway of commerce, and the other surrounding circumstances affecting the question."

In *Toledo Liberal Shooting Co. et al. v. Erie Shooting Club*, 90 Fed. 680, it appeared that appellee had leased from the owners between 3000 and 4000 acres of land for the purpose of using it as hunting ground. This area included a marshy body of water called Maumee Bay and a considerable part of its shore land. Appellant leased from the owners a compara-

tively small acreage completely surrounded by the lands leased to appellee. In the court below appellee had obtained an injunction restraining appellant from trespassing upon land covered by appellee's lease. Appellant contended that Maumee Bay was navigable, and among other witnesses doubtless produced the witnesses whose testimony is abstracted on page 203 of the Appendix to complainant's brief. Here, as in the Mintzer case, the Court gave consideration to the fact that this land had been conveyed to the state of Michigan as swamp land and the state in turn had conveyed it to individuals. At page 682 of the opinion it appears that in places there was a depth of 3 feet but there were large areas where the depth was only 12 inches deep except on unusual occasions. It was a natural feeding ground for duck and other water-fowl and was not a "*highway*, never has been, and can never be." Particular stress is placed upon the fact that it could not be used by the public. Here again we find a situation where there is no terminus to which the public have the right to go. At page 682 the court says:

> "It is nothing more or less than a marsh opening into the lake. To be navigable in law, it must be navigable in fact; that is, capable of being used *by the public* as a highway for the transportation of commerce."

In *Manigault v. S. M. Ward & Co. et al.*, 123 Fed. 707, which case is not cited by complainant, the court says at page 713:

> "In order to make a stream navigable by the public, it is not enough that it is floatable—that

> is, capable of floating vessels or other craft. It must be a public highway. To be a public highway, it must have a terminus, a quo the public can enter it, and a terminus *ad quem* they can leave it."

In calling attention to the last cited case we do not wish to be understood as contending for the doctrine there announced. As already stated, there is a conflict in the authorities with respect to that doctrine and it is immaterial in the case at bar. We merely refer to it as an apt statement of a doctrine which obviously influenced the court in each of the above cases relied upon by complainant.

In *Gulf & I. Ry. Co. of Texas et al. v. Davis et al.*, 26 Fed. (2d) 930, it appeared that a bridge across Mud Bayou had been constructed and maintained by the plaintiff railroad companies since 1896. It was a part of the plan of construction of the Intercoastal Waterway that the proposed canal would cross Mud Bayou at the point where this railroad bridge was located. The railroad companies refused to comply with the order of the Secretary of War and sought an injunction against the frequent prosecutions that would follow such disobedience. The question involved was not whether Mud Bayou was navigable but whether it was "navigable water of the United States." At page 932 the court says:

> "The whole country from Mud Lake to the mouth of the bayou is nothing but a marsh, entirely uninhabited, providing no article of commerce, and fit for nothing but the pasturage of cattle. Mud Bayou from its source down to its mouth is nothing but a mere drain for the marsh. The entire course of Mud Bayou lies wholly with-

in the state of Texas. It is not in any way or manner, nor has it ever been, nor in all probability will it ever be, an avenue of *interstate* or *foreign commerce*, because there has never been any interstate or foreign commerce carried on or to be carried over it, and in the absence of some changes in its condition, or in the condition of the surrounding country, it will never be."

It was admitted by plaintiffs that it would be possible for light draft boats to navigate Mud Bayou, but from all of the facts and circumstances appearing in the case it was obvious that there was no reasonable probability of such navigation. Under the evidence in the case at bar the question whether, in order to meet the criterion of intrastate navigability, there must be either a history of former or present navigation or evidence of probable future navigation seems to us to be purely an academic question. However, Chief Justice Marshall's admonition should be kept in mind when reading the opinion of the Court in *Gulf & I. Ry. Co. v. Davis.* As already stated, the question, before the court was whether Mud Bayou was "navigable water of the United States." Attention is directed to the fact that the power of Congress arises under the commerce clause of the Constitution; "it springs as an incident to the general power to regulate commerce, and being incidental springs, and only springs, *in aid of commerce past, present, or actively potential.*" (p. 933.) We will later advert to this question in discussing other cases where this Court points out that in determining what constitutes "navigable water of the United States" a line must be drawn at some point; that merely because a small boat might be able to travel from a creek or marsh through

a shallow channel into a great river such creek or marsh does not have the status of "navigable water of the United States."

Davis et al. v. Gulf & I. Ry. Co. of Texas et al., 31 Fed. (2d) 109, merely affirms the decision of the court below and refers to no fact or principle not mentioned above in our discussion of the trial court's opinion.

In *Leovy v. United States*, 177 U. S. 621, it appears that appellant was convicted in the trial court of unlawfully building a dam across a stream known as Red Pass without the consent of the Secretary of War. Here again the question before the Court was not whether Red Pass was navigable in intrastate commerce but whether it was "navigable water of the United States." Under the Act of March 2, 1849, Congress granted to Louisiana all swamp and overflowed lands found to be unfit for cultivation, the purpose of this grant being to aid that state in constructing necessary levees and drains to reclaim such lands. The Court (p. 626) arrives at the conclusion that the dam in question was "constructed under the police power of the State and within the terms and purpose of the grant by Congress." The court says at page 627:

> "It is conceded that Red Pass is not a natural stream, but is in the nature of a crevasse, caused by the overflow of water from the Mississippi River. This crevasse seems to have been formed some time before the grant by the United States to Louisiana, and the fact that by this and similar breaks through the banks of the river large tracts of land were rendered worthless, was, it may be assumed, well known to Congress, and was, indeed, the actuating cause of the grant.

"As respects navigation through Red Pass, there was some evidence, on the part of the government, that small luggers or yawls, chiefly used by fishermen to carry oysters to and from their beds, sometimes went through this pass; but it was not shown that *passengers* were ever carried through it, or that freight *destined to any other State than Louisiana*, or, indeed, destined for any market in Louisiana, was ever, much less habitually, carried through it."

At page 632 the court says:

"While, therefore, it may not be easy for a court to define the size and character of a stream which would place it within the category of 'navigable waters of the United States,' or to define what traffic shall constitute 'commerce among the States,' so as to make such questions sheer matters of law, yet, in construing the legislation involved in the case before us, we may be permitted to see that it was not the intention of Congress to interfere with or prevent the exercise by the State of Louisiana of its power to reclaim swamp and overflowed lands by regulating and controlling the current of small streams not used habitually as arteries of *interstate* commerce."

After quoting from instructions wherein the trial court charged the jury that if Red Pass was navigable and connected with waters that permitted a journey to another State it was "navigable waters of the United States," the court says at page 633:

"If these instructions were correct, then there is scarcely a creek or stream in the entire country which is not a *navigable water of the United States*. Nearly all the streams on which a skiff or small lugger can float discharge themselves into

other streams or waters flowing into a river which traverses more than one State, and the mere capacity to pass in a boat of any size, however small, from one stream or rivulet to another, the jury is informed, is sufficient to constitute a navigable water of the United States."

At page 634 the court says:

"A few fishermen testified that they occasionally went through this pass with small vessels, carrying oysters for planting, and one or two cargoes of willows and timber were spoken of. *None of these witnesses pretended to have carried produce or oysters out of the State.*"

In *Leovy v. United States, supra,* the Court does not hold that Red Pass was not navigable water of the State of Louisiana.

n *Brewer-Elliott Oil & Gas Co. et al. v. United States et al.*, 260 U. S. 77, the Court, after stating at page 86 its well settled rule that a river is navigable when used or susceptible of being used in its ordinary condition as a highway for commerce over which trade and travel are or may be conducted in the customary modes of trade and travel on water and that the mode or craft employed in conducting that commerce is immaterial, disposes of the question of the navigability of that stretch of the Arkansas River in controversy by saying that it will not disturb the finding of the two lower courts with reference to that fact. It then calls attention to the express grant made to the Osage Indians long before Oklahoma became a state, in which grant that portion of the bed of the river in controversy was clearly and unambiguously conveyed to said grantee, and announces its conclusion that a

title thus vested cannot be destroyed by later action on the part of Oklahoma.' The facts with reference to navigability are set forth in the opinion of the trial court and will be referred to in the next succeeding paragraph.

In *United States v. Brewer-Elliott Oil & Gas Co. et al*, 249 Fed. 609, various excerpts from testimony and evidence are recited at pages 617-623. The area in dispute was above Grand River in Oklahoma. Gen. Sibert testified (p. 621) *that he found no record* "of commerce above Grand River," although he said "*there was an account* of one or two boats going above it." It appeared from a report received in evidence and dated February, 1879, that from Wichita to Ft. Smith the river had a navigable depth for the first 70 miles of 6 inches and for the remainder of the distance a depth of 12 inches "with a channel much obstructed by snags." Another report dated 1881 described "difficulties indicative of non-navigable conditions." In 1884 a survey of the river was made from Wichita to Grand River and the report stated that "no portion was or had been considered navigable, and that the mouth of the Grand River was considered the head of navigation, commerce for 40 miles below being practically nil, adding that a small boat of light draft had made the trip from Little Rock to Arkansas City *on the crest of a short rise* carrying no freight of consequence, and of no practical benefit in demonstrating navigability." In this report the opinion was expressed that the river could be made navigable by dams, dikes and confined channels, ranging from 200 to 500 feet in different sections. In March, 1888, a permanent Board of Engineers on improvement of the river from Wichita to the mouth of

the Canadian River reported that the commerce over that section is and always has been practically nothing, estimated the cost of construction works of a navigable depth of two feet at low water as exceeding their value, expressed grave doubts as to maintaining it, and designated movable dams or a canal as a proper means of obtaining steady navigation, if justifying the expense. In 1891 another report was made, stating that a dependable two foot channel could not be obtained except in April or probably May or June.

In its opinion the trial court says at page 623: "The use of that portion of the river for transportation boats has been *exceptional* and *necessarily on high water*, was found impracticable, and was abandoned. The rafting of logs or freight has been attended with difficulties precluding utility. There was no practical susceptibility to use as a highway of trade or travel."

In *Brewer-Elliott Oil & Gas Co. et al. v. United States et al.*, 270 Fed. 100, the Eighth Circuit Court of Appeals makes only a meager statement of facts but refers to the opinion of the trial court (reviewed in the next preceding paragraphs of this brief) for such statement.

In *United States v. Rio Grande Dam and Irrigation Co.*, 174 U. S. 690, the government sought to restrain defendant from constructing a dam across the Rio Grande River. This Court's decision does not contain a very full statement of the facts with reference to navigability but the facts are quite fully recited at pages 675-676 of the opinion of the Supreme Court of New Mexico found in 51 Pac. 674. From the opinion of that court it appears that as

the Rio Grande traverses New Mexico, it spreads out over a wide area, over fine, light, sandy soil of great depth; that it is shallow; that bars continually form, pass away and reform, and that the quicksands in the bed of the stream and along its margin are perilous to life; that through that territory the fall of the river is from 4 to 52 feet to the mile, and that the changes in its course are rapid, continual and often radical; that "*in all the period of time only two instances were shown when the river was actually utilized* for the conveyance of merchandise, and each of those instances were of timbers," one such occasion being in 1858 or 1859, when a raft was sent down from Canutillo to El Paso, a distance of 12 miles, and the other more recently when some telegraph poles were floated from LaJoya, a "short distance." The government reports of exploration of the river for the special purpose of considering its navigability disclose that "The stream is not now navigable, and it cannot be made so by open channel improvement." Another report to the Secretary of War held "the construction, not only of an open river channel, but of any navigable channel, to be impracticable." Upon the facts presented the Supreme Court of New Mexico arrived at the conclusion that the portion of the stream in controversy was not navigable and dismissed the bill.

On appeal this Court agreed with the conclusion of the Supreme Court of New Mexico with reference to navigability of the portion of the Rio Grande involved in the action, but reversed and remanded the case, with instructions to make inquiry into the question whether the intended acts of defendants would substantially diminish the navigability of the

stream within the limits of present navigation, and if so, to enter a decree restraining those acts to the extent that they would so diminish navigability. This Court held (p. 698) that the "Rio Grande, speaking generally, is a navigable river;" that its navigability is a matter of common knowledge of which the courts may take judicial notice but that the courts are not presumed to know how far upstream its navigability extends. The Court observes that the mere fact that logs, poles and rafts might "occasionally" be floated down the stream in times of high water does not make it a navigable river. At page 699 the Court further says:

> "Obviously, the Rio Grande within the limits of New Mexico is not a stream over which in its ordinary condition trade and travel can be conducted in the customary modes of trade and travel on water. Its use for any purposes of transportation has been and is *exceptional*, and *only in times of temporary high water*. The ordinary flow of water is insufficient."

In *Oklahoma v. Texas*, 258 U. S. 574, Oklahoma claimed title to the entire bed of Red River; Texas claimed the southerly half; and the United States, which intervened in the action, disputed the claims of both States, asserting full proprietorship of the southerly half and, in behalf of certain Indian allottees, claiming an interest in portions of the northerly half. We will confine our examination of the case to those facts and statements of law which bear on the question of navigability.

Apparently there was considerable evidence as to navigability which the Court did not feel inclined to

accept at its face value. Speaking of the evidence on that question the Court says at pages 586-7:

> "The evidence bearing on this question is voluminous and in some respects conflicting. A large part of it deals directly with the physical characteristics of the river, comes from informed sources and is well in point. A small part consists of statements found in early publications, and repeated in some later ones, to the effect that the river is navigable for great distances—*some of them exceeding its entire length.* These statements originated at a time when there were no reliable data on the subject, and were subsequently accepted and repeated *without much concern for their accuracy.* Of course, *they and their repetition must yield to the actual situation* as learned in recent years. The evidence also discloses an occasional tendency to emphasize the exceptional conditions *in times of temporary high water* and to disregard the *ordinary conditions* prevailing throughout the greater part of the year. With this explanatory comment, we turn to the facts which we think the evidence establishes when it is all duly considered."

With reference to the characteristics of the river in the western half of the State the Court concludes from the evidence that "*only for short intervals,* when the rainfall is running off" was there sufficient depth of water for "*even very small boats,*" such rises as would permit of the operation of very small boats usually lasting only "*from one to seven days* and in the aggregate seldom cover as much as *forty days in a year.*" (p. 587.) At page 588 the Court concludes its observations with reference to the river in the western half of the State with the following comment:

> "We regard it as obvious that in the western half of the State the river is not susceptible of being used in its natural and ordinary condition as a highway for commerce; *and there is no evidence that in fact it ever was so used. That section embraces the receivership area.*"

Directing its attention to that portion of the river in the eastern half of Oklahoma, the Court says (p. 589) that, although light draft boats during one period carried merchandise upstream to the mouth of the Kiamitia and other points in that vicinity and took out cotton and other products on the return trip, such boat trips "*occurred only in periods of high water*, and was accomplished under difficulties." It then adds that in "very exceptional instances boats went to the mouth of the Washita, where some had to await the highwater of the next season before they could return."

At page 590 the Court refers to appropriations made by Congress in 1886, looking toward the making of a navigable channel, and to the fact that the officer in charge of the work "several times recommended that it be discontinued, because not likely to result in any commercial navigation; and in 1916 that officer, the division engineer, the Board of Engineers and the Chief of Engineers concurred in recommending that the project be entirely abandoned, their reasons being that the small (highwater) commerce of an earlier period had disappeared; that the characteristics of the river rendered it impracticable to secure a useful channel except by canalization, the cost of which would be prohibitive; that the expenditures already made were practically useless, and that there was no reason to believe con-

ditions would change in such way as to bring better results in the future."

At page 591, the Court concludes its observations with reference to the navigability of the river in the eastern half of the State as follows:

> "While the evidence relating to the part of the river in the eastern half of the State is not so conclusive against navigability as that relating to the western section, we think it establishes that trade and travel neither do nor can move over that part of the river, in its natural and ordinary condition, according to the modes of trade and travel customary on water; in other words, *that it is neither used, nor susceptible of being used,* in its natural and ordinary condition as a highway for commerce. Its characteristics are such that its use for transportation has been and must be *exceptional, and confined to the irregular and short periods of temporary high water.* A greater capacity for practical and beneficial use in commerce is essential to establish navigability."

In *The Daniel Ball,* 10 Wall. 557, no contention was made that the river there involved, to wit, Grand River, was not navigable in fact. The steamboat Daniel Ball had a draft of two feet and it was stipulated between the parties that it was actually employed in navigating Grand River between Grand Rapids and Grand Haven, Michigan. The boat had not been inspected or licensed, and the United States filed a libel to recover the penalty fixed in the federal statute. The owners of the boat urged in defense that Grand River was not navigable water of the United States, that the boat was not engaged in trade or commerce between two or more states

and hence was not subject to the federal navigation laws. Because Grand River was susceptible of being navigated in interstate commerce, the decree of the lower court imposing the penalty demanded for non-compliance with the federal Act was affirmed.

In *The Montello,* 20 Wall. 430, the government libeled the Montello for non-compliance with certain provisions of the federal statute. In that case it was contended by defendants that Fox River was not a navigable stream, and also that it was not navigable in interstate commerce.

As appears from the report of this case, the Wisconsin River flowed through Portage City at a point something less than two miles from Fox River. Merchandise coming from the headwaters of the Mississippi would be portaged over this two-mile stretch from the Wisconsin to the Fox River and thence to Lake Michigan. In its natural state, there were falls and rapids at various points in the Fox River; below certain rapids known as the De Pere, the navigation was especially difficult. There were many other similar though less difficult places. Notwithstanding these difficulties, the stream had from early times been used as a channel of commerce. In the early days long, narrow boats had been used, drawing two to two and one-half feet of water; "which men would push with poles or propel by oars, or have dragged by horses and mules; sometimes, in very shallow water, wading alongside and pushing the boats onward themselves. At places where progress on the stream was impracticable the vessel would be unloaded and a 'portage' made, till the navigator had got beyond the difficult place, and then a reshipment would be made of the merchandise into some other

boat beyond, or into the same boat, which unloaded, and drawing less water than before, could be got across the place that in a loaded state had stopped it."

After referring to the fact that the impediments to navigation, which existed when the river was in its natural state, had been "removed by artificial navigation," so that freight and passengers are now easily transported in boats over the river, the court says, at page 440:

> "It is said, however, that although the Fox River may now be considered a highway for commerce, over which trade and travel are, or may be, conducted in the ordinary modes of trade and travel on water, it was not so in its natural state, and, therefore, is not a navigable water of the United States within the purview of the decisions referred to."

The Court then refers to the fact that, notwithstanding the difficulties encountered in navigating the river in its natural state, it had actually been used for commerce, and says that "capability of use by the public for purposes of transportation and commerce affords the true criterion of the navigability of a river, rather than the *extent* and *manner* of that use." A more complete excerpt from the opinion of the Court in this case has already been quoted.

At page 442 of the opinion in *The Montello*, the Court quotes the language of Chief Justice Shaw in *Rowe et al., v. The Granite Bridge Corporation*, 21 Pickering 344, wherein Chief Justice Shaw said that it is not "every small creek in which a fishing skiff or gunning canoe can be made to float at high water which is deemed navigable, but, in order to give it

the character of a navigable stream, it must be generally and commonly useful to some purpose of trade or agriculture." In a later Massachusetts case, to wit, *Attorney General v. Woods,* 108 Mass. 436, the defendant sought to construe this language of Chief Justice Shaw very much as complainant seeks to construe it in the case at bar. After quoting this language of Chief Justice Shaw, the court says, at page 439-40 of the Woods case:

> "But this language is applied to the capacity of the stream, and is not intended to be a strict enumeration of the uses to which it must be actually applied in order to give it this character. Navigable streams are highways; and a traveller for pleasure is as fully entitled to protection in using a public way, whether by land or by water, as a traveller for business. Certainly fishing and fowling are as really regarded, on navigable waters, as trade and agriculture, though not mentioned in the case cited above; and in West Roxbury v. Stoddard, 7 Allen, 158, 171, it is said that the use of great ponds, which are public property, may as well be for bathing, boating, skating, fishing and fowling, as for business, and is entitled to equal consideration. If water is navigable for pleasure boating, it must be regarded as navigable water, though no craft has ever been upon it for the purposes of trade or agriculture. *The purpose of the navigation is not the subject of inquiry, but the fact of the capacity of the water for use in navigation.*"

We have read no decision of this Court that is not in complete harmony with the last quoted language of the Massachusetts court. We also contend that none of the decisions of lesser federal courts cited and relied upon by complainant, when read in the

light of the facts there before those courts, can properly be construed to be in conflict with said statement of the Massachusetts court in the Woods case. If the language of Chief Justice Marshall, in *Cohens v. Virginia*, is kept in mind, little difficulty will be encountered in interpreting any of the federal decisions that are pertinent in the case at bar.

In *Economy Light & Power Co. v. United States* 256 Fed. 792 (7th C. C. A.), a more complete statement of the facts is found than in this Court's decision. In its bill of complaint the United States alleged that defendant had, without the consent of Congress and without authority of the Illinois Legislature, commenced the construction of a dam in the Desplaines River at a point in Grundy County, Illinois; that said river at said point was navigable water of the United States; an injunction restraining further obstruction of the river by defendant was prayed for. At pages 793-7 the following facts, among others, are recited: The river rises in Wisconsin and runs in a southerly direction through Lake and Cook Counties, Illinois, until it reaches Riverside, some eleven miles from the mouth of the Chicago River; thence it takes a southerly direction through Cook and Will Counties to its confluence with the Kankakee River near the east line of Grundy County. Originally the river had a considerable quantity of swamp, marsh and bog at headwaters and in Lake County and in portions of Cook County and there were a number of lakes developed in Lake County which are responsible for the name of that county. Beginning near Riverside there were a great number of water expanses and connecting straits or channels 150 feet to a quarter of a mile in width at places and with vary-

ing depths up to 10 or 15 feet. These were formerly used as ice fields. Below the region just described, which extended for approximately 12 miles, there were a succession of ponds and shallow connections in the rock. This whole stretch was described in the original land survey as a "succession of swamps, ponds, lakes, and marshes connected by currents." Farther down there was a declivity at the rate of 7 feet per mile from a certain highway to the head of Lake Joliet, and still lower down there were some 10 miles occupied by pools, or Lake Joliet. Still farther down there came Lake Du Page, "some 13 miles in length, with a width of about 350 feet on the average, and with a depth of 10 feet and upwards, these pools being connected by intermediate rapids" like certain other rapids in the river referred to in the court's description of physical conditions. "The proportion of the Desplaines river itself from the end of the portage road to its mouth, or confluence with the Kankakee, that would consist of pools, would be about 60 per cent." In its original state there was "at the higher stages" sufficient water for a boat to go partially loaded from Romeo down to the head of Lake Joliet, "and at the lower stages to go down light, but at the lower stages the cargo itself would require a transfer over the 11 miles from Isle la Cache to Mount Juliet. All the river below Lake Joliet would be navigated by discharging the cargo in part or wholly at Treat's Island, and near the mouth of the river."

We invite particular attention to the gauge records referred to on pages 795-6 of the opinion. It there appears that the Riverside gauge stood "at or above 13 feet, an average of 73.2 days per year." During

47.6 days of the year the Riverside gauge stood at 13.8 feet, and on those days the stream flow was 1052 second feet. The gauge was at an elevation of 12.4 feet an average of 216.2 days per year and was at or above 11.85 feet, an average of 190.65 days per year. When the Riverside gauge stood at 13 feet the stream carried only 600 second feet of water. With the gauge at an elevation between 13.8 feet and 13 feet the water gradually diminished in depth on the Chicago Divide and portages in varying lengths became necessary. At an elevation between 13 feet and 12.4 feet on the Riverside gauge boats could no longer pass between Mud Lake and the Desplaines River, although along some stretches of the river there would be a navigable depth of 15 inches. When the Riverside gauge was between 12.4 feet and 11.85 feet longer portages were necessary over certain stretches, and there was a navigable depth of from 12 to 15 inches with lesser depths at some points. The statement of facts does not disclose the number of second feet flowing in the river when the gauge was below 13 feet. However, in view of the fact that at 13 feet the stream flow was only 600 second feet and that the gauge was that high during only 73.2 days of the year, it is apparent that "in its ordinary condition" the Desplaines River was not at all comparable in size or navigable capacity with the Colorado, Green or Grand Rivers along the stretches involved in this suit.

At pages 797-8 appears a statement of the navigation history of the river. The Court says that from the latter part of the seventeenth century to the first part of the nineteenth century, men engaged in the fur trade passed up and down the Chicago and

Desplaines rivers in canoes and flat boats "very regularly." However, the Court immediately adds that "fourteen specific instances of the use of the Deplaines down to the year 1830, are shown in the evidence," and proceeds to enumerate those fourteen instances. Then follows a statement that there were very many other trips made during that time that are "not so well authenticated." The Court then says: "The trial judge found, as the record shows, that there is no evidence of actual navigation within the memory of living men * * *" Then follows a statement of the type of craft used, the largest being Durham boats sixty feet long, eight feet wide, two feet deep, with a capacity of fifteen tons and drawing 20 inches of water. All commerce on the river ceased in 1825, and as early as 1889 several dams had been constructed across the river.

In *Economy Light & Power Co. v. United States*, 256 U. S. 113, the Court does not attempt a full statement of the facts stating that the "details are given in the opinion of the Circuit Court of Appeals and need not be repeated." At pages 121-2, it is said:

> "The Circuit Court of Appeals, in passing upon the question of navigability, correctly applied the test laid down by this court in the Daniel Ball, 10 Wall. 557, 563; and The Montello, 20 Wall. 430, 440-443; that is, the test whether the river, in its natural state is used, *or capable of being used as a highway for commerce*, over which trade and travel is or may be conducted in the customary modes of trade and travel on water. Navigability, in the sense of the law, is not destroyed because the watercourse is interrupted by occasional natural obstructions or

portages; *nor need the navigation be open at all seasons* of the year, *or at all stages of the water.*"

In *United States v. Holt State Bank et al.*, 270 U. S. 49, title to the bed of Mud Lake in Marshall County, Minnesota, was in controversy. Before suit was commenced the lake had been drained so that its former bed was dry land. At pages 56-7 the facts upon which the Court's decision rests are set forth. It there appears that in its natural and ordinary condition the lake was from three to six feet deep. Mud River traversed it in such a way that the lake might well be characterized as an enlarged section of the river. Early visitors and settlers used the river and lake as a route of travel, "employing the small boats of the period for the purpose. The country about had been part of the bed of the glacial Lake Agassiz and was still swampy, so that waterways were the only dependable routes for trade and travel." Mud River, after passing through the lake, connected with a navigable water route. The river and lake had been used by merchants in two settlements in sending out for and bringing in supplies. The Court says, at page 57:

> "True, the navigation was limited, but this was because trade and travel in that vicinity were limited."

Continuing its statement of the facts, the Court says, at page 57:

> "In seasons of great drought there was difficulty in getting boats up the river and through the lake; but this was exceptional, the usual conditions being as just stated. Sand bars in some parts of the lake prevented boats from moving

readily all over it, but the bars could be avoided by keeping the boats in the deeper parts or channels. Some years after the lake was meandered, vegetation such as grows in water got a footing in the lake, and gradually came to impede the movement of boats at the end of each growing season, but offered little interference at other times. Gasoline motor boats were used in surveying and marking the line of the intended ditch through the lake and the ditch was excavated with floating dredges.

"Our conclusion is that the evidence requires a finding that the lake was navigable within the approved rule before stated."

At page 56 the well-settled law is thus reiterated:

"The rule long since approved by this court in applying the Constitution and laws of the United States is that streams or lakes which are navigable in fact must be regarded as navigable in law; that they are navigable in fact when they are used, or are susceptible of being used, in their natural and ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water; and further that navigability does not depend on the particular mode in which such use is or may be had—whether by steam boats, sailing vessels or flatboats—nor on an absence of occasional difficulties in navigation, but on the fact, if it be a fact, that the stream in its natural and ordinary condition *affords* a channel for useful commerce."

In *Alabama Power Co. v. Gulf Power Co. et al.*, 283 Fed. 606, the Court says, at page 613:

"The *capability* of use by the public for purposes of transportation and commerce is the true

criterion of the navigability of a river, rather than the *extent* and *manner* of its use. U. S. v. The Montello, 20 Wall. 430."

Under this title complainant cites, in addition to the cases above analyzed, the following:

Packer v. Bird, 137 U. S. 661
St. Anthony Falls Power Co. v. Board of Water Commissioners, 168 U. S. 349
United States v. Cress, 243 U. S. 316
Donnelly v. United States, 228 U. S. 708

Each of the last cited cases is in accord with the decisions of this Court, above analyzed, and adds nothing pertinent to the case at bar.

Under the law announced in the foregoing decisions, we earnestly contend that the evidence in the case at bar conclusively establishes the navigability in fact and in law of all stretches of river flowing over the beds here in controversy outside Cataract Canyon. The witnesses have testified without contradiction that they navigated these streams at all seasons of the year, at flood and at normal stage, at high and at low water. Some describe difficulties encountered, but they reached their destination. Women and children have successfully and without mishap piloted boats along stretches of the rivers where some of complainant's witnesses say they encountered most trouble in navigating. Complainant's witness Mendenhall says that in all the years during which he navigated these rivers he never lost a boat or suffered any mishap of any character. Upon the record in this case we cannot believe that it can be seriously contended that one familiar with these rivers will

encounter any grave difficulty in navigating them at any stage of water. Upon complainant's own testimony these streams should not be held unnavigable unless the language of this Court in *Economy Light & Power Co. v. United States* be modified so as to declare the law to be that "navigability, in the sense of the law, *is destroyed* if the water course is interrupted by occasional natural obstructions or portages, or if the navigation is not open at all seasons of the year and at all stages of the water;" and the language of the Court in *The Montello* should also be modified so as to declare that a river "is *not* navigable if its navigation is encompassed with difficulties by reason of natural barriers such as rapids and sand bars."

PHYSICAL CHARACTERISTICS.

Approximately three pages (52-5) of complainant's brief proper are devoted to the above subject, and practically all of the Appendix (98-187) is apparently intended as a supplement to those three pages. Because testimony concerning actual navigation and various other matters are included under this general title in the Appendix, we shall endeavor, as best we may, to segregate the various alleged impediments to navigation referred to in complainant's exceptions.

Logs and Debris.

We observe no record page in the brief or its Appendix indicating where any witness testified that navigation was ever prevented by logs or other debris in either of the rivers.

Under its exception No. 21, complainant objects to

the finding of the Special Master on this subject "because such finding is contrary to the greater weight of the testimony; that floating logs and debris do impede the operation of the boats on the rivers is amply sustained by the testimony of the following witnesses:" (Here follow references to the testimony of Eddy, Blake, Sawyer, Loper and Johnson) At the pages indicated Eddy says that certain objects appearing in a picture shown to him are driftwood; Loper says that on an occasion referred to by him, the water was high and there was lots of drift, which make it "pretty bad in boating rapids or any other place"; Blake says that on one occasion when there was a flood the driftwood might have been serious, that it was necessary to dodge the logs, branches and sticks so that they would not stick on the bow of the boat or run into it; Johnson says that at certain times of the year there was considerable driftwood in the river at Lees Ferry. The other witness, Sawyer, told of the collection of driftwood on the guy ropes that held the dredge in place when the Government was drilling for bedrock at the junction of the Green and Grand Rivers; this was on the occasion when a flood came down, and because of the high water and accumulation of driftwood on the guy wires, he feared that the machinery might be lost and removed the dredge.

None of the witnesses referred to in support of this assignment pretended to say that driftwood ever kept him off the river or injured his boat or impeded his progress or otherwise actually interfered with his navigation. Having in mind the scores of witnesses called by both sides to relate their experiences and to detail any mishap or impediment to navigation en-

countered by them, it is quite remarkable that no mention was made of obstruction to navigation occasioned by driftwood, if any such thing ever happened. The finding of the Special Master (M. R. 80-1) is amply sustained by the record.

Ice.

Ice as an alleged impediment is made the subject of complainant's exception number 22. Here, again, we must look to the citations appearing under said exception for references to the record. We looked at the record page indicated opposite the names of the first two witnesses there referred to, to wit, Hoyt and Lumsden, and finding no reference to ice in the testimony there cited, arbitrarily picked out the names of Rust and Bennett appearing later, and find no references to ice at the pages indicated opposite those names. However, several witnesses speak of the presence of ice in the rivers and, at times, it was doubtless an impediment to navigation. However, we believe the record establishes that ice is much less of an obstruction on these rivers than on most of the other navigable streams of this country.

Complainant's witness, Frank Bennett, who spent approximately twenty-two years of his life on the Colorado River, says (R. 3236-9, Vol. 17) that as a rule an ice gorge on the lower Colorado breaks within twenty-four to forty-eight hours, and that the longest period he has ever known such a gorge to last is about one week. He further says (R. 3191-4, Vol. 17) that he has no recollection of ice ever forming on the river through Glen Canyon except along the edge, but he has seen the ice cakes freeze together so that there was a gorge or ice jam clear

across the river; he does not think that the ice ever freezes so that there would be solid ice across the river. Neither the Green nor the Grand Rivers freeze every year, and the boats of the Moab Garage Company traveled up and down the Grand River during every month of the year 1926. Complainant's witness, Baldwin, testified (R. 1192, Vol. 6) that the Grand River froze over in the winter of 1924-5 but that it has not frozen over since that time and that such an occurrence is unusual. As stated by the Special Master, the Green River freezes less frequently than does the Grand. The testimony of the following witnesses, most of them complainant's witnesses, establishes that the statement of the Special Master (M. R. 81) concerning the period during which ice forms on these rivers fixes that period at least as long as any evidence warrants: Baldwin (R. 1164; 1192, Vol. 6); Bennett (R. 3191-4, Vol. 17); L. M. Chaffin (R. 3299-3306, Vol. 18); A. L. Chaffin (R. 4935-9, Vol. 28); Fotheringham (R. 4991-2, Vol. 28); Wimmer (R. 4851-2, Vol. 27); John Galloway (R. 1060-1, Vol. 6); Hyde (R. 4441-5, Vol. 25); C. E. Baldwin (R. 5086-7, Vol. 29); Empey (R. 5128-30, Vol. 29).

We respectfully submit that the statement that the rivers are closed "for practically 100 days of every year" appearing on page 53 of complainant's brief, is wholly unsupported by the evidence. On the stretch below Cataract Canyon, the Colorado River is practically never non-navigable because of ice and passage up and down that stretch of river is not prevented by ice except during the rare occasions when an ice jam forms, the duration of which is usually from twenty-four to forty-eight hours. The testi-

mony abstracted in the Appendix to this brief conclusively establishes that the miners navigated through Glen Canyon during all of the winter months. The testimony of complainant's witness, Virgil Baldwin, and of other witnesses above referred to, demonstrates the fact that navigation on the Grand River is practicable throughout every month in many years. Again we say that the finding of the Special Master (M. R. 81) reflects the fact with reference to navigation impediments occasioned by ice, at least as favorably to complainant as the record warrants.

It will be observed that the Special Master, in his finding with reference to ice, accepts the statements contained in complainant's exhibits 94 and 89, referred to on page 101 of complainant's brief, and that in so doing he accepts as applicable to the area of the Grand River here in dispute, the statement of exhibit 89 concernig ice conditions near Cisco, located northerly from and in a colder section than the area at and south of Moab. The statement contained in said exhibit is directly at variance with complainant's assertion on page 53 of its brief that ice "closes the rivers for practically 100 days of nearly every year."

High Water.

At page 87 of complainant's brief, reference is made to the Special Master's comment that the court's description of the Arkansas River in United States v. Brewer-Elliott Oil & Gas Co., 249 Fed. 609 at 623, wherein it says that the use of that river by boats was exceptional and necessarily on high water, does not fit the Green and Colorado Rivers. Thereupon, counsel for complainant make the following observation:

"True, the operation of boats on the Green and Colorado in Utah was not at times of high water. High water on these rivers was a hazard to be avoided".

We are surprised to observe the foregoing statement that the rivers here involved are so different in character from the Arkansas and Red Rivers, where navigation is confined to exceptional periods of temporary high water.

At pages 53-4 of its brief, complainant speaks of the alleged 100 days during which boats are kept off the river because of ice, then refers to the high water months of spring and early summer, and the floods of early fall, as obstructions to navigation; then mention is made of sand bars, shallow depths during low water months, rapids and riffles—so that one unfamiliar with the record would necessarily conclude that navigation is utterly impossible throughout the entire year.

Perhaps the very limited time allowed us in which to prepare this reply brief has prevented our noticing some place in complainant's brief or in its exceptions where a reference is made to a page in the record at which testimony can be found that navigation ceased or was interrupted on one or more portions of the rivers because of floods or high water.

We do not recall a single witness who testified or even intimated that navigation ceased or was interrupted upon the Green, Grand or Colorado Rivers by the spring rise or so-called spring flood, or by any later rise in the rivers occasioned by summer or autumn rains. On the contrary, the uncontradicted evidence is that the witnesses navigated these rivers in high water and in low water; whenever they desired

to go to any point on the river they set out in their boats and they reached their destination. In all of the hundreds of trips described by the witnesses, taken at all stages of water and at all seasons, we recall only a very few instances where any happening of any character prevented a successful completion of the contemplated journey. We recall not a single instance where high water occasioned such a result. . . .

We refer to our Appendix for a statement of the navigation of the rivers at all stages of water. It is apparent that complainant does not believe its statement that "the operation of boats on the Green and Colorado Rivers in Utah was not at times of high water", because at the following pages of its brief specific reference is made to a few of the many trips described in the evidence that were taken during flood and high water stages: at page 160 of its brief, complainant speaks of a trip by Stirling during the higher stage of water; on the same page, reference is made to Blake's trip during highwater when there was lots of driftwood in the stream; on page 163, reference is made to a trip of Loper "at flood stage"; on page 166, reference is made to Nye's trip where he says that because of rain and a rise in the river, little trouble was encountered; on page 167, reference is made to the testimony of complainant's witness, Galloway, that his trip was during high water, so that he had less trouble from sand bars; on the same page, reference is made to a trip of Blake up through the Slide and to his testimony that the occasion "was one of the highest water seasons in years"; on page 179, reference is made to L. M. Chaffin's trip during the spring flood in May; on

page 183, reference is made to the testimony of George H. Chaffin concerning rafting done during the high water period of May and June.

Had the Special Master found otherwise than he did find with reference to this matter, the evidence would obviously have been utterly insufficient to sustain such finding.

Silt and Sediment.

Defendant has made no tests of the water in these rivers to determine their silt content. In the light of the testimony of certain witnesses for complainant and even if we consider estimates appearing in Government reports, it would seem that the making of such tests sheds no very great light upon the subject. On pages 133-5 of appellant's brief appear various estimates of solid content in the water of the rivers. Neither of the men making those estimates was a witness in this case, and the information there appearing is contained in official reports. Fortier and Blaney give the amount of silt carried in the Green River at Green River, Utah, during a one-year period, as something over eight million tons. Mr. Howard's estimate is over fifty million tons during a one-year period. Complainant says at page 133 of its brief that the Howard estimate is "based on much more complete information than was available to Fortier and Blaney." We recall no testimony supporting this statement in the brief. According to Fortier and Blaney, silt carried in the Colorado River near Cisco during a nine month period was a little over nine million tons, whereas Mr. Howard estimates the silt load during a twelve month period at twenty-five million tons. Again there appears the statement that

Mr. Howard's figures are more accurate, without giving any reason for the statement.

We respectfully submit that even complainant must be in a somewhat uncertain state of mind with reference to the amount of silt and sediment carried in suspension by these rivers. We concede that they carry a considerable amount of solid matter, but fail to see wherein that fact has affected or now affects navigation except for its contribution to bars in the stream, which may impede the progress of one not familiar with their location.

Later in the brief we shall answer complainant's contentions with respect to the alleged "head of navigation" at the foot of Black Canyon, and will then call attention to the fact that below Black Canyon where complainant not only admits, but asserts, navigability of the Colorado River, more than twice as much silt and sediment is carried in the river, as at Lees Ferry. Above the mouth of the San Juan River, which contributes a vast amount of solid matter in suspension, a comparison as to solid content with the Colorado River below the foot of Black Canyon would disclose a much greater difference.

The finding of the Special Master on this subject (M. R. 81-2; 140-1) reflects the actual situation with respect to silt and sediment at least as favorably to complainant as the facts warrant.

Unstable Channel and Bars.

The only matters with reference to which there is a real, substantial conflict in the testimony are with reference to bars and channel.

Colonel Dent, who visited certain sections of the rivers for the first time in his life a few days before

the taking of testimony began, entertained a very pessimistic view with reference to sand bars, depths and channel. Several members of Government survey parties testified concerning frequent groundings on sand bars. Three or four engineers for oil companies that had been concerned in pending litigation with the State of Utah involving the validity of Government oil permits upon the Colorado River, told of different occasions when their boats had stuck on sand bars and described alleged difficulties in locating a permanent channel—especially after a change in water stage. In addition to these witnesses, there were a few other Government witnesses who testified as to alleged unstable channel and groundings on sand bars. However, it is very significant that those of complainant's own witnesses who had had most experience on the rivers entertained no such opinions as those expressed by the witnesses last above referred to, and corroborated the testimony of the old river men produced in behalf of defendant.

The testimony of Thomas G. Wimmer, an old river man who, as complainant's witness Freeman expressed it, was usually "right" about matters pertaining to the river and the operation of boats, detailed his experiences and expressed views concerning navigation impediments that were in substantial harmony with the testimony of most of the other witnesses for each of the parties to this cause who had navigated the rivers for considerable periods. We will now refer to portions of Mr. Wimmer's testimony on this subject:

> Some of the side washes are very large and at times quite large floods come down them and deposit a large amount of silt—sometimes rock.

This usually occurs in the fall of the year when the river is lower and will push it over a little bit, making a narrow place with rapid water. I have not seen such conditions created where a channel has not been left through which boats of the type I have operated could pass up and down. As the river washes it away the condition created by these side floods disappears. In Labyrinth and Stillwater Canyons I have never seen the channel so narrow or so low that I couldn't go up and down in the Marguerite. Nor did I ever meet with a condition that stopped my progress in that boat. I have seen both the Green and Colorado Rivers where for some distance the stream is divided, and on the first trip downstream at such a place you can't always tell which is the proper channel. Usually at a bend the long way around is the proper channel and we try that first but are sometimes fooled. On a straight stretch in the river where there is a braided channel I have never had any trouble and was always able to locate the proper channel. (R. 4787-90, Vol. 27.) In going downstream for the first time during a given year you may come to a place where the water divides into two or more streams and one may look as good as the other; you may go down one for a distance and find that it becomes shallow and the water from it may go over a shallow bar into one of the other channels so that you can't continue down. Coming upstream it is much easier to pick the right channel than going down. In my experience I have never found a condition where there was not a channel if I knew where to find it. If I have made a recent trip down the river I know where I will find the channel unless in the meantime there has been a big flood. (R. 4791-2, Vol. 27.) The swiftest part of the water may or may not be in the channel of the river. As the water rises it may strike a rock bank which will cause

a current across the river in a different place from the low water channel. (R. 4795, Vol. 27.)

I don't think the low water channel shifts; the current shifts. In making a trip down the river this year you will find the channel in the same place as last year; as to sand bars, I am not looking for them—I try to find the channel; the sand bars don't amount to much. (R. 4838-9, Vol. 27.)

Complainant's witness Chenoeweth, who was in charge of the 1921 survey from the mouth of Green River downstream, testified that he did not recall having any difficulty in getting the boats through the rapid water between Green River, Utah, and the mouth of the San Rafael, and that from the mouth of the San Rafael to the mouth of the Green River he recalled no difficulty with his boats either through Labyrinth Canyon or through Stillwater Canyon, and that he did not recall encountering any sand bars. (R. 3888, Vol. 21.) We have been unable to find any testimony on the part of Mr. Chenoeweth that he encountered any difficulty on account of sand bars or alleged unstable channel between the mouth of the Dirty Devil (Fremont River) and Hall's Crossing where his party was surveying in July and August, 1921.

Defendant's witness, Tasker, has had considerable experience on the rivers, and in 1921 was a member of the Chenoeweth survey party, most of whom, unlike their chief, testified for complainant concerning difficulties with channel and bars. If complainant's summary of Tasker's testimony, appearing on page 162 of its brief, was intended to aid the court in determining the nature or substance of that testimony,

we are sure that such purpose is not achieved. Here, as in many other places in complainant's brief, the statement of the nature and substance of the testimony is very different from our view of what the record actually shows. The substance of Tasker's testimony, as set forth on pages 162-3 of complainant's brief, records his statement that other boats used on the surveying trips frequently struck sand bars. We invite attention to the entire digest of the testimony of this witness appearing in the Appendix to this brief. What he actually said is, that while making surveys on the river he and the other rod men were required to take positions at designated points; sometimes one man was used on one side of the river and one on the other side; at other times they would criss-cross back and forth; it was necessary to go to the point indicated in order to run the line; that in going down the Green River he does not recall a single instance where they struck a sand bar when going straight down the river; he would, of course, hit a sand bar when landing (R. 5443-7, Vol. 31). On the stretch below Cataract Canyon, he says that members of the party were frequently stuck on sand bars because if the chief told them to "give him a shot" from a certain point, one might get stuck on a sand bar in going there; many times the line of travel would be along the channel and they could reach there all right in their boat; at other times when the course necessarily pursued led into shallow water, away from the channel, they would strike a bar. He testified that he personally recalls no occasion when he was stuck on a sand bar in doing that survey work on the lower Colorado except when he had deliberately left what he knew to be the channel of the stream;

also that he never saw the boat of any other member of the party get stuck on a sand bar when in the channel of the river (R. 5447-9, Vol. 31).

Frank Bennett and Louis M. Chaffin did more boating and rafting of freight on the lower Colorado River than any other of complainant's witnesses. Bennett, who navigated the river throughout an aggregate period of more than twenty years, told of a very few isolated instances when he met with difficulty. Chaffin also testified concerning a few occasions when he met with some mishap or delay. The testimony of these two men concerning bars and channel on the lower Colorado is significant. With reference to the shifting of the bed or changing of channel in the Colorado River, Frank Bennett says: "After the river had settled down to low water or normal water, there is very little change, unless something in the way of some obstruction would come, might have a tendency to throw it on the other side." He then adds that such an obstruction would be an unusual occurrence. (R. 3235, Vol. 17.) Mr. Chaffin says that "after the river raised a foot or so, the effect on the bars didn't bother you, only to know where to go. There was room after the river raised, there was always room to get through these places if you knowed where to find them. After the spring raise commenced, always a channel." (R. 3305-6, Vol. 18.)

Wimmer says that during high water you don't hunt for a channel; if you get careless you may strike the top of a high bar that during lower stages of the river is an island (R. 4850-1, Vol. 27). Complainant's witness Mendenhall, also an old river man of many years experience on these streams, especially on the lower Colorado, describing a trip to Lees Ferry, says

that he does not remember encountering any sand bars; that of course there were bars, but that no bars "interfered with us except perhaps in landing we would find some sand near the shore; didn't bother us" (R. 3480-3, Vol. 19).

That the channels of the rivers do not greatly shift along the areas in dispute is evidenced by many uncontradicted facts in the record. Water wheels, constructed years ago on the edge of the Green River, are still in such position that they may be operated just as they were at the time of their construction (R. 4806, Vol. 27). The bars and riffles described by Captain Leeds in the report of the War Department of 1910 are still in the same position, and Mr. Hoyt had no difficulty in locating and identifying each of them. Those riffles and bars are upstream from Stillwater Canyon, and after the Green River enters that Canyon it is confined, like the Grand and Colorado, within canyon walls, so that any opportunity to travel far from its fixed course is slight. The various bars on the lower Colorado which were operated and named by the miners long before statehood, are still there upon the river, substantially unaffected by any later occurrences.

On these, as on any river, there may be some temporary obstruction at a side wash following an unusual storm, but the overwhelming weight of the testimony confirms the statement of one of the witnesses that the river does its own housecleaning.

The finding of the Special Master (M. R. 87-97; 141-3) as to the nature and effect of sand bars and changing channel does not minimize any impediment to navigation resulting from such cause.

Depths.

It is interesting to note the testimony of complainant's witnesses Hoyt and Dent referred to on page 127 of complainant's brief. With a flow of only 4,000 second-feet, Hoyt noted thirty-six places between the mouth of the Green River and Moab where the water was less than two and one-half feet deep, whereas Colonel Dent, along the same stretch and with a flow of 6,000 second-feet, noted forty-nine groundings. Apparently, the river became more shallow as the volume of water increased.

There is some evidence that a ledge of rock extends for some distance across the bed of the Colorado River at a point near Shock Rapid in Glen Canyon. We note the purported digest of the testimony of the complainant's witness, Rust, appearing at pages 180-1 of complainant's brief. The witness is there quoted as saying with reference to this place, in substance: "channel not less than a foot deep to right side." What the witness actually says (R. 2284-6, Vol. 12) is that there is a channel at that point forty or fifty feet wide, no part of which is less than a foot in depth and, at all stages of water when he has ever seen it, there were parts of the channel where the depth was two or three feet. That those who know the river are familiar with this channel and are thus able to avoid the difficulty described by some witnesses as having been encountered by them at that point, appears from the testimony of Chaffin (R. 4935-9, Vol. 28) and Wimmer (R. 4818-20, Vol. 27).

We shall not take the time and space to supplement the evidence as to depths set forth in the report of the Special Master (M. R. 98-103; 149-151), except to invite attention to the fact that the depths there

tabulated by him are "mean" and not "channel" depths.

Rapids:

It is admitted that all portions of the Green River and all of the Grand River from Moab to the confluence is quiet water with no suggestion of a rapid at any point except at the Slide. As will be seen from a reading of the testimony of the witnesses for both parties digested in the Appendix to this brief, power boats (except the City of Moab on one occasion) have never had any difficulty in navigating up or downstream at the Slide during any stage of water. Boats propelled by man power alone are towed for a short stretch at that point. There are two or three points above Moab where rapid water exists for a short distance.

Complainant's witness, Freeman, said (R. 2582, Vol. 14) that in the first forty or fifty miles above Lees Ferry there was nothing "except by a stretch of the imagination" that could be called a rapid, the nearest approach to a rapid being at Aztec Canyon. The witnesses agree that the so-called Aztec Rapid is the most severe bit of rapid water along any portion of the area between the foot of Cataract Canyon and the Utah-Arizona line. As pointed out by the Special Master (M. R. 146), only one rapid along that entire stretch is noted on complainant's exhibit 10. At a few points there is rapid water, but none that would occasion the slightest impediment to up or downstream travel with a power boat of even moderate capacity. As indicated by the uncontradicted testimony of the witnesses, they have sailed up practically all of the stretches of rapid water in Glen Canyon,

and as shown by what we deem to be the great weight of the evidence, no unusual hardships or effort were involved in making upstream boat trips with no power other than man power. This subject has been covered by the defendant in its brief supporting its exceptions herein. In this connection we invite attention to pages 82-7 and 143-9 of the Special Master's report.

Sand Waves and Wind.

We recall no testimony of any mishap due to sand waves on the Colorado River (the phenomenon does not occur on the Green or Grand), except one incident described by complainant's witness Rust. Mr. Rust has for years been engaged in the business of conducting sightseeing parties through Glen Canyon. On one occasion two men who were in his party and who apparently knew very little about boating, made no attempt to avoid the sand waves by steering their boat to one side of the river where the effect of the waves is not felt. Mr. Rust says that by their own carelessness and failure to follow his boat, they were capsized, with no resultant personal injuries. The appearance of sand waves is not frequent and their duration is short. A boatman of any experience would entertain no difficulty in going straight through them if he desired to do so, and none of the men who navigated the rivers ever gave the matter of sand waves a thought. Plaintiff's witness, William Hiram Edwards, who was with the Stanton expedition in 1889 and returned to the river in later years, spending a very considerable amount of time there, says (R. 1958, Vol. 11) that he never saw a sand wave on the Colorado River. Notwithstanding the graphic de-

scription of sand waves quoted on pages 149-150 of complainant's brief, we assert that there is not a scintilla of evidence in the record that sand waves ever kept any boatman off these rivers or interrupted his navigation of the streams or that any mishap of any character ever resulted from sand waves except only the incident described by Mr. Rust.

At page 116 of its brief, complainant accounts for the uncontradicted evidence of many of the witnesses for both parties that they frequently sailed up the river, by the observation that such a feat might be possible because at times the wind blows through Glen Canyon "with terrific force." We have no doubt that in Glen Canyon, as elsewhere, there are at times high winds, but the inference that any unusual wind had any part in the sailing operations of the miners is wholly unwarranted and finds support in no testimony appearing in this record.

Variations of Flow

It appears to us that the tables appearing on pages 117-119 of complainant's brief are misleading, if it is intended thereby to reflect actual conditions on the rivers as they would be encountered by the navigator.

It is true, as stated on page 117 of complainant's brief, that at one time there was a minimum daily discharge at Green River, Utah, of 510 second-feet. This occurred on December 1, 1920. As appears from complainant's Exhibit No. 88 there was one day in 1926, when the gauge record indicates a minimum flow of 600 second-feet; in 1909 there was one day when the Green River gauge indicated a minimum flow of 750 second-feet; and one day in 1911 when that gauge indicated a stream flow of 770 second-feet. There

was one day in 1910 when the gauge record shows a minimum stream flow of 800 second-feet. Aside from the years just mentioned, there was not another day during all of the twenty-five years while the Green River, Utah, gauging station has been maintained when the minimum daily stream flow did not exceed 800 second-feet. Time and space do not permit us to here present a detailed statement of the comparatively few days on the Green River when its minimum daily stream flow was under 800 second-feet.

As stated on page 118 of complainant's brief, there was one occasion, to-wit, on September 4, 1924, when the minimum daily stream flow of the Colorado River at Cisco was 866 second-feet. As appears from complainant's Exhibit No. 88 and other exhibits, there was no other year in the entire period during which the Cisco gauging station has been maintained when the minimum daily stream flow was less than 1460 second-feet.

As appears from the last mentioned exhibit, the gauge at Lees Ferry showed a discharge of 1000 second-feet on December 27, 1924; on December 26, 1924, the flow was 1500 second-feet; and after December 27, gradually rose until it reached 1500 second-feet, the next day 2400 second-feet, and thereafter continued a steady rise. We recall no evidence which explains this extraordinary drop of the river during those few days of December, 1924. The minimum daily stream flow at Lees Ferry during any other year while that station has been maintained was 2290 second-feet.

Stream Depletions Caused by Irrigation.

Because the Colorado and its tributaries rise in very high altitudes where there is abundant snow and low temperatures, the run-off is greatly diminished during winter months, and with the spring comes the annual rise characteristic of such rivers. Diversions for irrigation purposes have had little if any effect on stream flows during the winter months, but such diversions during the past thirty years have obviously had a marked effect upon stream flow after the spring rise subsides in early July and until October. Therefore, when Utah was admitted into the Union, these rivers carried considerably more water during the so-called low water months and their navigable capacity has been somewhat diminished.

One second foot of water running for twenty-four hours equals approximately two acre feet (R. 5168, Vol. 29).

As appears on pages 126-7 of complainant's Exhibit No. 58 (Water-Supply Paper 395) 302,000 acres of Colorado land were, as early as 1913, irrigated with water from the Colorado River and its tributaries. We have not access to information concerning additional acreage thus irrigated since 1913, nor as to the acreage of Utah lands above Moab thus irrigated. On said last mentioned pages of said exhibit, in estimating depletions on account of irrigation, 3.5 acre-feet is given as the duty of water and it is estimated that there is a twenty-five per cent return flow. Accepting 3.5 acre-feet as the duty of water and allowing for a twenty-five per cent return flow, the flow of the Colorado River is each year depleted by reason of water diverted for irrigating said 302,000 acres of

land in an amount equal to the continuous stream flow throughout three hundred sixty-five days of a stream at all times carrying 760 second-feet of water.

On pages 134-5 of said Exhibit No. 58, it is stated that in 1913, there were 500,000 acres of land irrigated with water diverted from the Green River and its tributaries, above Green River, Utah. This, of course, includes acreage in Utah and Wyoming. We have not access to any data showing the amount of increase in irrigated lands and diversions of water since 1913. Again accepting the report's assumption of 3.5 acre-feet as the duty of water and allowing for a twenty-five per cent return flow, the flow of the Green River is each year depleted by reason of water diverted for irrigating said 500,000 acres of land in an amount equal to the continuous stream flow throughout three hundred sixty-five days of a stream at all times carrying 1258 second-feet of water.

At page 137 of said Exhibit No. 58, it is stated:

> "In Utah, Colorado, and Wyoming, in the upper basin, water is diverted for irrigation during a more or less definite period commonly called the 'irrigation season,' which usually extends from April 1 to October 1; on the lower Colorado, though the rate of demand varies from month to month, there is no definite irrigation season, water being diverted for irrigation throughout the year."

So-called Commercial Experiments and Minor Boats.

Although our digest appearing in the Appendix to this brief contains a more detailed statement of the boating experiences of the witnesses than that set forth in the Report of the Special Master, many suc-

cessful river trips were recounted by the witnesses which are not specifically mentioned in the Appendix. We believe we have there referred to every boat trip in the course of which any mishap occurred. Because in the Appendix we have endeavored to accurately reflect the substance of the testimony relating to actual navigation, we shall not at this point attempt a further detailed statement. We invite attention to pages 52-80 and to pages 124-137 of the Special Master's Report where he gives a brief summary of the evidence relating to navigation of the rivers.

Perhaps the partisan view-point often entertained by the lawyer clouds our perspective so that we have not a clear vision of the real meaning of the evidence. However, we are sincere in our contention that complainant's interpretation of many vital items of evidence bearing on the question of navigability, is wholly unwarranted by the record.

Four boats are selected from among the scores of boats that plied these rivers, and the fact that none of the four was commercially successful and made only a few river trips is specially stressed.

The Undine, which, as we recall, made only two and one-half round trips between Green River and Moab, capsized while ascending a riffle at a point a few miles above the town of Moab. Referring to the Undine, the Report of the War Department, defendant's exhibit number 18, says: "It is stated that this would have been a success had it not been wrecked through poor management."

The City of Moab, re-named Cliff Dweller, made only a few river trips and was later taken to Great Salt Lake, where the owner anticipated more profit-

able operations. However, complainant's witness, Yokey, notwithstanding all of its navigation difficulties and the limited number of patrons in that frontier country, was quite willing to continue its operation, and at the time when it was taken to Salt Lake, he and another man had a contract with the owner for a continued operation of the boat on the Green and Grand Rivers. He released the owner from this contract when the opportunity arrived for using the boat on Great Salt Lake (R. 3419-3421, Vol. 18).

The Major Powell was a clumsy, awkward boat, entirely unsuited to the rivers. On page 32 of its brief, complainant says that "the history of this boat is important on the question of navigation because it was an enterprise undertaken commercially and at the instance of the Rio Grande Western Railroad." The entire basis for the above quoted observation is the somewhat ambiguous statement of complainant's witness, Edwards (R. 1925, Vol. 10) that the railroad was "in a way" interested; that it was through young Mr. Dodge of the railroad company that the venture was undertaken. Just what connection, if any, young Mr. Dodge ever had with the railroad company or what the nature of his interest in the boat may have been, is not disclosed in the record. The witness says that "they helped us out, furnished us transportation and everything they could to help us along," but when asked whether or not they helped finance the expedition, the witness said:

"No, they did not help finance the expedition; that was financed privately."

The fourth boat to which complainant draws special attention is the Charles Spencer, which operated for a short time on the lower Colorado. It seems

that Mr. Spencer had some ambitious mining ventures in the vicinity of Lees Ferry and his company went into the hands of a receiver. Defendant had no testimony concerning the alleged operations of this boat, and from the statements of witnesses for complainant it was a failure. Even complainant's statement as to the Charles Spencer appearing on page 61 of its brief that "the boat in all brought about eight tons of coal to Lees Ferry" is erroneous. Complainant's witness, Freeze, testified (R. 2603, Vol. 14) that on the first trip the boat brought down three or four tons of coal; on the second trip it brought a little more, and on the third trip it brought fifteen or twenty tons down the river.

In its Brief and Appendix, complainant makes frequent reference to the testimony of its witness, Virgil Baldwin, with reference to boating operations of the Moab Garage Company. It is true that he made more trips on the largest of the boats operated by that company, than did any other witness, but it is not true, as stated on page 147 of its brief, that he "has made more trips on the Colorado River below Moab than all of the rest of the witnesses put together." On the contrary, we believe the record establishes that his older brother, who, with complainant's witness Clark, owned the Moab Garage Company, has traveled two, and probably five times as many miles on the Grand River as he has. (See Appendix for testimony of each of these witnesses.)

On page 60 of complainant's brief appears the following statement:

"Sand bars were encountered on approximately 75 per cent of the trips, and it was usually necessary to take lines ashore to free the boat. Twenty-five per

centum of the time the boat was stuck from a few hours to a day and a half."

The foregoing reference is to the testimony of Virgil Baldwin. What that witness actually said is (R. 1208-1210, Vol. 6) that in his trips on the large boat he had no navigation difficulties in going either up or downstream twenty-five per cent of the time; during fifty per cent of the time he estimates that they had no difficulties that tied them up for more than a few minutes, and during the remaining twenty-five per cent of the time he suffered delays of two or three hours, at other times five or six hours, and on three occasions, a delay of a day or a day and a half. One of those three occasions was when ice collected in the river and it was necessary to blast a way through, and the other two occasions were due to unusual conditions described in his testimony.

It is very difficult to reconcile the testimony of Virgil Baldwin with that of complainant's witness Clark, who said that during each of the years referred to by Virgil Baldwin he was upon the ground as manager of the company, keeping in close touch with the trips and of the freight carried; that during all of that period there was no serious incident which interfered with navigation (R. 974, Vol. 5); that he had personally been up and down the river several times on the large boat and on those trips there was not a single occasion when it was stuck on a sand bar (R. 959-63, Vol. 5); that the sand bars are generally found in the same place, can usually be avoided, and that he has never been stuck on them for any length of time (R. 964-6, Vol. 5).

The testimony of C. E. Baldwin, Albert Beach and Dave Johnson, abstracted in the Appendix to this

brief, corroborates the testimony of complainant's witness Clark, and flatly contradicts that of Virgil Baldwin. There are only two or three places where the large boats ever encountered serious navigation difficulties, and at those places the trouble was only temporary and was occasioned by a flood coming down from a side wash at those points. After the first trip through, no difficulty would be encountered even at those points, and in a very short time the purely local condition would be corrected by the river itself. Even Virgil Baldwin admits (R. 1164-5, Vol. 6) that the large boat ran steadily for five months beginning in March, 1925, with occasional trips from that time on during that year, and that during 1926 trips were made during every month of the year. He says that during that period their loads would average between twelve and fifteen tons. Johnson says (R. 5260-4, Vol. 30) that between December, 1925, and June, 1926, when he worked on the large boat, their loads averaged eighteen or twenty tons, and that they hauled as much as twenty-two tons at one load. While he worked on the boat they had a great amount of upstream freight, including equipment of various kinds needing repair and also oil. Among other freight transported were supplies for cattle outfits, and they moved the camps of cattlemen to different points downstream (R. 5271, Vol. 30). They made trips to Lockhart with the big barge and several trips below No. 2 Well; they used river water in their radiator without settling the water and their engine was in no way injured by the river water; they had a tank connected with the radiator and a practical and effective cooling system (R. 5274, Vol. 30).

Several other boats were in constant use by Moab

Garage Company in carrying freight and passengers up and down the river from Moab to the junction, and on these boats no difficulties or delays were encountered by reason of sand bars or other cause. C. E. Baldwin says (R. 5022-6, Vol. 29) that a conservative estimate of the freight hauled by the company boats since 1925 would be thirty-five hundred tons; that they have hauled hundreds of passengers on their various boats and these operations were commercially profitable; this traffic was interrupted only on the one occasion when the large barge was caught in an ice jam. Baldwin says that cost per ton mile on the river was less than on the company's trucks, and in his testimony (R. 5026-52, Vol. 29) he gives detailed figures concerning this matter. He corroborates (R. 5033-8, Vol. 29) the testimony of many other witnesses that it would not be feasible or practicable to haul material overland to points downstream on the river or to attempt building a highway for that purpose.

Complainant's witness R. C. Clark testified (R. 961, Vol. 5) that his company filed its schedule of rates with the Public Utilities Commission of Utah.

On page 61 of its brief, complainant says that "undoubtedly in the near future" the large boat of the Moab Garage Company will be dismantled. We are not aware of any evidence in the record justifying this statement. When the last testimony was heard before the Special Master, the owners of this boat testified that it was there on the river ready for use, that they fully anticipated further profitable operation of it and only a short time previously had hauled a considerable tonnage of freight up the river.

Many other boats were operated by the oil com-

panies while drilling operations were in progress on land near the Grand River.

In its brief, complainant speaks of the alleged abandonment of the Marguerite, Wilmont and other boats. The Marguerite was operated regularly for compensation during a priod of several years until Mr. Wimmer left Green River. During that time he advertised for and engaged in the business of river navigation. Mr. Wolverton was for years engaged in the same occupation with the Wilmont, Navajo and other boats on the Green and Grand Rivers. We refer to our Appendix for a narrative of the navigation of many other boats on these rivers.

In complainant's brief there are so many of what we deem unwarranted interpretations of the evidence that we cannot hope to cover each of them here. Among those which now occur to us is the statement with reference to a power boat of the California Edison Company which had so much difficulty in making upstream progress in Glen Canyon. The original engine in this boat was of ample capacity (40 h. p.) and it is true that when first placed on the river it was very inefficient. Wimmer (R. 4774-9, Vol. 27) fully explained the cause of the trouble encountered. Originally the boat was equipped with a four-foot paddle wheel which spun about without taking hold of the water. At Mr. Wimmer's suggestion, the paddle wheel was changed to an eight-foot wheel, and the paddles were placed farther apart; the forty horsepower engine was removed and a second-hand engine from a Ford automobile supplanted it. After it was thus changed, Mr. Wimmer says that he observed no further trouble in operating it.

On page 65 of complainant's brief appears a sum-

mary of what it deems to be the testimony of the witness Branson, relative to rafting between Castle Creek and Moab. Mention is there made of submerged rocks, the loss of one and one-half rafts, the water-logging of the rafts and their sinking down because of the accumulation of mud. A reading of this alleged summary would cause one unfamiliar with the record to believe that Mr. Branson entertained a very pessimistic view concerning the capacity of the river for logging purposes. What this witness actually said is that in 1897 and 1898 and again during the years between 1902 and 1909, they rafted lumber from Castle Creek to Moab, the rafts averaging about sixty-four feet in length by sixteen feet in width, and carrying from ten to fifteen thousand feet of lumber in each raft; they took down about ten rafts a year (R. 4709-14, Vol. 27). Once in a while a raft would get stuck on a submerged rock, but this did not occur on every trip and was not a common occurrence, and none of the rafts was ever stuck in the mud or on sand bars; although mud got in between the boards, the only effect of this was to make them soggy and cause the raft to draw more water and run slower; they never had to tow the rafts downstream and the only power they had to use was the river (R. 4727-9, Vol. 27); no trouble was encountered with ice in the winter (R. 4730, Vol. 27), although they did this rafting during each month of the year from June to December (R. 4714, Vol. 27); aside from losing about three thousand feet of lumber from one raft, they had no mishap during all of that period of years and all of their rafts went through (R. 4715-17, Vol. 27).

At pages 148-9 and elsewhere in his Report the Special Master directs attention to certain testi-

mony in which a comparison is made between the different sections of the rivers with respect to navigability.

We believe the greater weight of the testimony, as well as the physical facts disclosed in the record, establish that more impediments to navigation exist in the stretch of Grand River between Moab and Well No. 1, located approximately twenty miles down stream, than on any other portion of the rivers here involved. Along that twenty mile section Kane Spring Wash, Mill Creek and Court House Wash come into the river. When an unusual rain occurs, with a resultant flood down those washes, material is sometimes brought down so that the channel of the river may be temporarily affected and some difficulty encountered by a large boat, such as the Moab Garage barge, when making its first trip past those points at such times. In this connection we invite attention to the testimony of Albert Beach (R. 5096-5101, Vol. 29).

Complainant's witness, Hoyt, says (R. 300, Vol. 2), that in his opinion it would be as easy to go up and down the Green River between its mouth and the mouth of the San Rafael, as to go up and down the Grand between the mouth of the Green River and Moab. However, he also states (R. 285, Vol. 2), that he encountered much more trouble with sand bars on the Grand than on the Green River.

Complainant's witness, Shaw, says (R. 3658, Vol. 20), that the difficulties of navigation on the Grand between the confluence and Moab are similar "or probably worse" than on the Green River.

Complainant's witness, Richardson, says (R. 3695-6, Vol. 20), that the conditions on the Green

River and on the Grand between Moab and the confluence are essentially the same.

Defendant's witness, Wimmer, says (R. 4856-8, Vol. 27), that in his opinion the current is a little stronger on the Colorado through Glen Canyon than between the mouth of the San Rafael on Green River and the junction of that river with the Grand; that the only difference between the two sections of river in up-stream travel would be the difference in power required; that with a boat like the Marguerite "there is not enough difference in the two waters to make any difference."

Complainant's witness, L. M. Chaffin, says (R. 3326-31, Vol. 18), that so far as shallow water and sand bars are concerned the difficulties of navigation on the Green River from the San Rafael down to the confluence are greater than on the Colorado River between the foot of Cataract Canyon and the Utah-Arizona line; that he has made no up-stream journey on the Green River, but there are more interruptions to down-stream travel on that river than on the Colorado below Cataract Canyon; except that more power would be required in navigating up-stream through Glen Canyon on the Colorado River, he would say that up-stream navigation difficulties on the Green River would be greater.

We have found no evidence contradicting the testimony of the witnesses relative to the comparative navigability of the sections of river involved. In view of that testimony and the history of navigation disclosed in the record, we submit that neither the actual use nor the susceptibility to use as highways for commerce, of all sections of river here involved, can be seriously questioned.

DOCUMENTARY EVIDENCE AS TO NAVIGABILITY.

Statements recorded by such men as Major Powell and Mr. Dellenbaugh, long before any controversy had arisen, would seem to be entitled to great weight. In addition to what these men have written concerning the characteristics of the Green and Colorado Rivers is the report of the War Department, made more than 20 years ago under circumstances which preclude the possibility that the government engineers, who made the survey and examination, could have had any motive to exaggerate the navigable capacity of those streams.

Although in the course of their journeys Major Powell and Mr. Dellenbaugh apparently proceeded in a leisurely manner, studying the adjacent country and making frequent landings, they were not, like the government survey parties of recent years, making surveys of the rivers and along the sides of the rivers, which compelled them to continuously cross back and forth and proceed to certain points regardless of the river channel. They were not, like Major Stanton, making a railroad survey or examining and locating bars in the stream or monumenting and fixing the corners of mining locations. Generally speaking, they probably did their boating along portions of the river where obvious impediments to progress would be avoided.

In the report of Major Powell (Complainant's exhibit No. 51) he describes, at pages 52-6, his journey from the mouth of the San Rafael to the mouth of the Green River. His party was on that stretch of river between July 14 and July 17, 1869. On pages 67-73 he describes his journey from the foot of Cat-

aract Canyon to the mouth of the Paria below Lees Ferry, Arizona. He was on the last mentioned stretch of the river, making side trips, etc., between July 28 and August 4, 1869. Not a single mishap, danger, difficulty or navigation impediment is recorded on his journey from the mouth of the San Rafael to Lees Ferry except in Cataract Canyon. On the pages above indicated he frequently comments on the quiet water and pleasant nature of the journey. Speaking of the ride through Labyrinth Canyon he says, at page 54 of said exhibit:

> "There is an exquisite charm in our ride today down this beautiful canyon."

Speaking of his journey through Stillwater Canyon on July 17 he says, at page 55:

> "The stream is still quiet, and we glide along, through a strange, weird, grand region."

On July 31st (page 70) he speaks of the "cool, pleasant ride today" and of his arrival at the mouth of the San Juan. Through these pages he graphically describes the wonderful scenery and speaking of his journey after passing the mouth of the San Juan and as he continues down Glen Canyon he says, at page 72:

> "Past these towering monuments, past these mounded billows of orange sandstone, past these oak-studded glens, past these fern-decked alcoves, past these mural curves, we glide hour after hour, • • •"

In the Appendix we refer to the testimony of Mr. Nims, who was with the Stanton party, and to ex-

cerpts written by him many years ago. With reference to the journey from Green River, Utah, to the mouth of the Green he said, in 1890:

> "We had a pleasant sail down the Green of one hundred twenty miles, to its junction with the Grand, forming the Colorado."

(Complainant's exhibit No. 177, at page 258 of Mr. Nims' article in "The Commonwealth," August, 1890, entitled "Through the Colorado River.")

On the same page of said article Mr. Nims records:

> "In the beginning of Cataract Canon, we encountered our first real rapid * * *"
>
> "Here (at the head of Cataract Canyon) ended the 'picnic' part of our trip."

(Complainant's exhibit No. 177, at page 74 of Mr. Nims' article "Profile Negatives Canned.")

> "We now pushed out (from Tickaboo) and owing to the long stretches of smooth water, with very few rapids we arrived at Lees Ferry, one hundred fifty miles below * * *"

(Complainant's exhibit No. 177, at page 259 of Mr. Nims' article "Through Mysterious Canons of the Colorado.")

> "From this point (mouth of Dirty Devil) to Lees Ferry, Arizona, one hundred fifty miles, the trip was uneventful."

(Complainant's exhibit No. 177, at page 75 of Mr. Nims' article "Profile Negatives Canned.")

At pages 175-9 of Complainant's exhibit No. 13 (The Romance of the Colorado River, by Fred-

erick S. Dellenbaugh) appears a very entertaining recital of what is there denominated "White's Fiction." The author there refers to "yarns" told by Mr. White concerning the inaccessible depths of the canyon, White's alleged terrifying experiences as he and other members of his party "clung to the raft as it dashed against half-concealed rocks, or whirled about like a plaything in some eddy," White's tales of "foaming waters," etc. After reviewing in delightful fashion these wild stories of Mr. White, the author denominates them as "nonsense," and at page 179 of said exhibit No. 13 adds:

> "They were not yet, even taking their own, or rather his own, calculations, near the Grand Canyon, and the whole one hundred and fifty-nine miles of Glen Canyon are *simply charming; altogether delightful. One can paddle along in any sort of craft, can leave the river in many places, and in general enjoy himself. I have been over the stretch twice, once at low water and again at high, so I speak from abundant experience.*"

In view of the fact that the river through Glen Canyon is not wider than the Grand River between Moab and the junction and not quite as wide as the Green River, and in view of the further fact that, although a little swifter through Glen Canyon, no great difference in gradient exists between that stretch and the stretch above the junction of the Green and Grand, there can be little doubt that throughout Glen Canyon the river is as readily navigable as either of the other sections. The history of navigation appearing in the record, as well as the testimony of witnesses, establishes this fact.

The report of the War Department (Defendant's exhibit No. 18) sets forth the careful investigation made by the Army engineers relative to the navigability of Green River from Green River, Utah, to its mouth and of the Grand River from Moab to the mouth of the Green. The report is brief and the facts upon which the Army engineers base their conclusion are therein fully set forth. We readily concede that said conclusion is not as matter of law controlling in this case but submit that it is entitled to great weight. The sole purpose of that survey was to determine the question of navigability, and we know of no other government report or survey for such purpose except such as have been made for purposes of this litigation. Although the expressed conclusion of the Army engineers may not be deemed controlling, we contend that the indisputable facts appearing in their report establish as matter of law the soundness of their finding that those sections of the rivers covered by their report are navigable waters of the State of Utah.

WHAT IS COMMERCE WHEN NAVIGABILITY IS THE ISSUE?

We are unable to see any merit to complainant's contention that a river is not navigable unless boats of heavy draft and carrying a great tonnage in freight traverse it. It is argued that because one witness in the Red River case testified that steamboats came up that river loaded with merchandise of various kinds, and another witness said that he once saw a boat upon that river which drew three and one-half or four feet, navigation by such boats is not sufficient to meet standards fixed by this Court; that this is true be-

cause the Red River was held to be non-navigable. Similar reasoning is applied to other cases referred to in the Appendix, and attention is invited to the fact that on the rivers here involved, boats of the draft and capacity described by witnesses in some other cases have not been used. As already indicated, we have no means of determining whether this Court accepted the statements of the witnesses reproduced in complainant's Appendix. But, if we properly understand the decisions referred to by complainant this Court did not intimate that the types of boats mentioned by the witnesses were not of sufficient size or capacity, and did not intimate that the navigation of a river by boats like those described by the witnesses in this case, among which boats is the Moab Garage barge (75 feet long, 15 feet wide, with a draft of 20 inches; R. 961-2, Vol. 5) would not meet any requirement established by this Court in determining the navigability of water. The Red, Arkansas and Rio Grande Rivers were held to be non-navigable because, and only because, the period during which they were *susceptible* to navigation was *exceptional*. They could be navigated *only during temporary periods of high water*.

We are aware of no case modifying the statement in the Montello that "*capability* of use by the public for purposes of transportation and commerce affords the true criterion of the navigability of a river, rather than the *extent* and *manner* of that use," and that the mode in which the commerce may be conducted is immaterial. "*Vessels of any kind that can float upon the water*," is the statement of this Court with reference to the type of craft that may be employed.

In *United States v. Holt State Bank*, 270 U. S. 49, this court again unequivocally states that navigability does not depend upon the mode in which a body of water is navigated. It may be "by steamboats, sailing vessels or flat boats," and the test is whether or not the water affords a channel for useful commerce.

Complainant is in error when it in effect states on page 86 of its brief that the Special Master misconstrues the language of the Court in *Oklahoma v. Texas*. We have carefully checked the matter appearing in quotation marks in the Report and find that every word there placed within quotation marks is correctly copied.

Following its criticism of the special Master's perfectly accurate quotation from the decision of this Court in *Oklahoma v. Texas*, complainant observes that the evidence in the case indicates that "light boats are always on the eastern section of the Red River." Had counsel read the next succeeding paragraph to that quoted and indented on page 86 of their brief, they would have observed the language quoted by the Special Master, and would have appreciated the error of their conclusion that the evidence in the Red River case indicates that light boats are always on the eastern section of that river. This Court there expressly states that "boats of light draft carried merchandise up the river," etc., and then adds:

> "This occurred *only in periods of high water* and was accomplished under difficulties."

It is true that some of the witnesses, including Wimmer and Wolverton, who engaged in the business of boat transportation for hire, testified that it was not profitable. However, both Wimmer and Wolver-

ton followed that occupation for many years and earned their livelihood in that manner. None of these men was able to afford the extensive advertising necessary to attract the tourist trade, and was compelled to rely upon the patronage of those who happened to have some business at points along the rivers. When we consider the few people who lived in that country and its undeveloped condition, it is not strange that the vocation of these men was not very remunerative. On the other hand, the operations of the Moab Garage Company demonstrate what the reward of river transportation for hire may be, when the country becomes more settled and developed.

However, we find no language in any decision of this Court intimating that the only "public" use of a stream is that by one engaged in transportation for hire, or that the only commerce on a stream is from a use of the stream which directly involves barter and sale.

In *Railroad Company v. Fuller*, 17 Wall. 560, this Court says:

> "Commerce is traffic, but it is much more. It embraces also transportation by land and water, and all the means and appliances necessarily employed in carrying it on."

A contention that navigable waters of a state are for the sole use and benefit of the very limited portion of the public who may be engaged in the business of buying and selling, and that unless a river is navigated for such purpose, it is not navigable in law, would be obviously at variance with every principle underlying the law of navigable waters and the basis upon which the right of the sovereign to control such

waters rests. The fact that they constitute a present or potential highway for the "public" gives to them their public status. The farmer, artisan, fisherman, lumberman, etc., have navigation rights equal to those of one engaged in barter and sale. No single trade has a monopoly of the use of navigable waters, nor is it necessary that people engaged in any particular trade must use such waters in order to make them navigable in law.

In *The Montello,* mention is made of the use of navigable water in the fur and lumber trades, and the Court also quotes with approval Mr. Justice Shaw, who speaks of the use of a navigable stream for "the purposes of trade or agriculture." In many other decisions, mention is made of the use of waters by those engaged in the fur, lumber and other trades.

In *The Nymph,* 18 Fed. Cases 506, Judge Story says in response to a contention that the mackerel fishery was not a trade:

> "The argument for the claimant insists, that 'trade' is here used in its most restrictive sense, and as equivalent to traffic in goods, or buying and selling in commerce or exchange. But I am clearly of opinion, that such is not the true sense of the word, as used in the 32d section. In the first place, the word 'trade' is often, and indeed generally, used in a broader sense, as equivalent to occupation, employment, or business, whether manual or mercantile. Wherever any occupation, employment, or business is carried on for the purpose of profit, or gain, or a livelihood, not in the liberal arts or in the learned professions, it is constantly called a trade."

In *Beall v. Beck,* 2 Fed. Cases 111, Chief Judge Cranch says:

"One of the legal definitions of trade is 'a way of living.'"

The most important industry or "trade" in Utah is and has been mining. In *Smith v. Cooley*, 2 Pac. 880, the court says at p. 882:

"The working of a mine under a bare 'mining right' has been uniformly considered by courts of equity as a species of trade."

In the case at bar we have uncontradicted evidence of the actual use of all three of the rivers in question in mining, beginning at a time long prior to statehood, and thereafter. There is uncontradicted evidence of like use of the rivers by trappers engaged in the fur trade. There is evidence of use of certain sections in the lumber, oil and other trades. The Moab Garage Company, Wolverton, Wimmer, Rust and some others have engaged in the trade or vocation of hauling freight and passengers for compensation. From the viewpoint of those living in this sparsely settled section the use of these rivers in trade and travel has been very considerable.

Obviously each of the various uses to which these rivers have been put, is "commerce." We can think of no lawful commerce that is not "useful commerce."

Even if it appeared from the evidence in the case at bar that the stretches of river here involved, aggregating more than three hundred miles of navigable water and open for the free use of the public at all points, had never been navigated at any point during all of their history, we respectfully submit that under the decisions of this Court said sections of river would be navigable in law and the beds thereof would belong

to defendant. We can not believe that the repeated declaration of the Court that a river is navigable in law when it is either used or *susceptible to use* as a highway of commerce, is mere idle surplusage. As has been so often said, water is navigable in law if it "affords" a channel for useful commerce or if it is "capable" of being thus used. We can not believe that any court would declare as matter of law that an immense area of undeveloped country has no future hope and that great rivers traversing it will never serve the purposes of commerce. Certainly no such conclusion could be arrived at in the light of the record in this case, which discloses vast potentialities in eastern and southeastern Utah.

At this point we wish to refer to the testimony of Governor George H. Dern, of Utah, that no work has ever been done by the State of Utah, the United States or any other agency, in improving navigability on either of the rivers (R. 5384, Vol. 31).

In this connection we invite attention to pages 105-117 and to pages 151-3 of the Special Master's Report.

FUTURE COMMERCE.

At page 80 of its brief complainant says:

> "A river can not become a 'highway of commerce' unless those who operate boats can accomplish these trips with sufficient profit to themselves to warrant continuance * * *. The Master speculates on future commerce * * *. This court did not do that in *Oklahoma v. Texas;* or in *Brewer-Elliot Oil Co. v. United States, supra.*"

We have already referred to the matter of "profit" as an element in commerce.

From the inception of this case it has seemed to us that the wild, undeveloped, sparsely populated territory adjacent to these rivers, with the incidental absence of continuous and substantial commerce as compared with commerce along navigable rivers in the older and more densely populated states, has impressed complainant much more profoundly than any alleged absence of navigable capacity in the streams. We are aware of no decision or legal principle sustaining the theory announced by complainant in the above quoted excerpt. It is true that the vast territory in eastern and southeastern Utah, lying tributary to these rivers, is sparsely settled and undeveloped, and that hundreds of thousands of acres are as barren as was Salt Lake Valley when the Mormons arrived there in 1847. It is one of America's last frontiers. Complainant, and not the Special Master, enters the realm of "speculation" when it assumes that there will be no future use of the rivers in trade and travel. Anyone familiar with the history of the West would hesitate to declare that immense mineral wealth may not at any time be discovered in the immediate vicinity of any or all of the stretches of river here involved, in which event they would at once become highways of a commerce sufficiently extensive to even satisfy the requirements of complainant.

Notwithstanding the undeveloped state of the country and its sparse population, each of these rivers has a history of navigation which conclusively establishes its navigability along the stretches involved, and that navigability is not "occasional" or "exceptional", but *is present during every season of the year, including the low water stage.* If complainant entertains the view that the past navigation of these rivers has

not been sufficiently extensive, we invite attention to the language of this Court in *United States v. Holt State Bank*, 270 U. S. 49 at 57, apparently spoken in answer to a contention that "the small boats of the period" used by visitors and settlers on Mud River and the amount and frequency of navigation shown by the evidence in that case, were not sufficient to satisfy the requirements of navigability:

> "True, the navigation was limited, but this was because trade and travel in that vicinity were limited."

During the course of the trial we stated our contention that it is wholly immaterial, so far as the question of navigability is concerned, whether the country traversed by a river is new, undeveloped and sparsely populated or thickly populated. It is equally immaterial whether the adjacent country is capable of supporting a large or a small population. The nature and extent of public rights are not determined by the *size* of the public. Utah was admitted into the Union on an equality with the original States, and Utah rivers of navigable capacity are no less navigable in law, than are New York rivers of navigable capacity.

The eastern and southeastern portions of Utah are more undeveloped and sparsely settled than most other sections of the State, although the 1920 census shows that only 449,396 people then lived on its 84,990 square miles. It is reasonable to assume that there will be future growth in wealth, industry, commerce and population.

It is probably a generally accepted fact that today more acres are under cultivation by the farmers of

America than are necessary to produce sufficient crops to supply existing demands. Just how long this condition will continue can, of course, not be foretold, but we are not entering the realm of speculation when we say that at some future time vast areas of land now used only for grazing in eastern and southeastern Utah will be farmed. Evidence of silver, copper, gold, vanadium, uranium, manganese and other mineralization in sections adjacent to these rivers is in the record. The evidence discloses the existence of coal veins in certain sections near areas in dispute. Extensive forests are found on Elk Ridge and in the LaSal, Blue and Henry Mountains. From testimony hereinbefore abstracted it appears that great quantities of "flour" gold are in the bars of the Colorado and San Juan Rivers. No process has yet been discovered for obtaining satisfactory results in extracting and saving gold in this form. In the Bill of Complaint herein it is alleged in subdivision numbered VI, that deposits of oil and gas have been discovered within portions of the riparian lands and extending to and under the river beds here in controversy.

Among the witnesses testifying concerning the potentialities of this section of Utah in agriculture, mining and other respects are Albert R. Lyman (R. 4365-71, Vol. 25); A. S. Woods (R. 4411-22, Vol. 25); E. T. Wolverton (R. 5328-30, 5342-4, 5363-4, Vol. 30; R. 5395-7, Vol. 31); Horace W. Sheley (R. 5451-66, Vol. 31); F. W. Keller (R. 5467-75, Vol. 31); T. G. Wimmer (R. 4807-8, Vol. 27); and Governor George H. Dern (R. 5385-6, Vol. 31).

Governor George H. Dern testified (R. 5385-6, Vol. 31) that he has visited many of the scenic sections of the West to which tourists go in great numbers, in-

cluding Zion National Park, Bryce's Canyon National Park, Grand Canyon, Rocky Mountain National Park, Yellowstone National Park, and says that the section of the Colorado River below Moab and also the stretch of river between Crescent Wash and Lees Ferry is "an outstanding piece of natural scenery, and if it were developed so it would be easy and convenient for people to make the trip it would be a very popular and attractive trip;" that he makes this statement having in mind the other scenic sections of the West to which he refers. This testimony of Governor Dern is fully corroborated by Mr. Dellenbaugh in his books that were received in evidence and by other witnesses in the case. Other evidence confirms the fact that the Green River along the stretch in controversy is quite as wonderful in scenery as is the Colorado River. There is no reasonable doubt that in the not far distant future tourists in great numbers from all sections of the country will visit these rivers and, except in Cataract Canyon, will travel in boats up and down the entire stretches of river in dispute. We contend that such use of the rivers, even if their use in carrying supplies and other freight between different points which would necessarily be incident to the handling of tourists were excluded, will constitute commerce, and a "useful" commerce, within the meaning of the decisions of this Court.

The very nature of a large portion of the country immediately adjacent to the stretches of river here involved makes their navigation not only convenient and desirable but absolutely necessary. Miners and oil men have always used them in the past and will always use them in the future. The rivers are the only highways available to man or left by nature along practically all of the stretches in dispute.

"HEAD OF NAVIGATION."

Much is said in complainant's brief concerning an alleged "head of navigation" at the foot of Black Canyon. At pages 24-5, attention is directed to expeditions made by Lieutenant Ives in 1858 and by Lieutenant Wheeler in 1871, and excerpts from the reports of these men are there quoted. In his report, Lieutenant Ives says that the practical head of navigation should be considered as located at the foot of Black Canyon, 356 miles below Lees Ferry, and Lieutenant Wheeler states that the practical head of improved navigation must permanently remain at the foot of Grand Canyon.

Having made no survey or examination of any portion of the 356 miles of river between Black Canyon and Less Ferry, and the matter of navigability over that stretch not being in issue because of the admissions in defendant's answer, we do not care to enter upon the question of the location of the head of navigation on the lower Colorado River. Obviously, Messrs. Ives and Wheeler were merely intending to record what they believed to be the highest point past which a boat might proceed upstream from the lower stretches of the river. Both reports were made years before any white man had ever gone through Marble or Grand Canyons, and it can not be assumed that either Lieutenant Ives or Lieutenant Wheeler intended to express an opinion concerning the navigability of the Colorado River along hundreds of miles of river which they had never seen, and concerning which no record of exploration had ever been made.

We do not wish to minimize the weight that should be given to settled opinion where the head of naviga-

tion has been fixed at a certain point along a river whose length has been fully explored and whose navigable capacity has been demonstrated by the experience and common practice of those traveling upon it. However, even as to a stream of that character, the statement or opinion contained in a Government report or elsewhere concerning the head of navigation, is merely evidence whose weight and credibility must depend upon all of the surrounding facts and circumstances. We venture the surmise that both Lieutenant Ives and Lieutenant Wheeler would be profoundly surprised to learn that the statements contained in their reports had been interpreted to mean that the Colorado River is not navigable through Glen Canyon and that the sections of river above Cataract Canyon are non-navigable. In their reports they were obviously discussing the lower Colorado River, and were merely expressing their opinion that boats could not proceed farther upstream than the foot of Black Canyon.

We do not question the ability or accuracy of either Lieutenant Ives or Lieutenant Wheeler, and accept what they say with reference to the facts and conditions as they found them. In view of those facts, which are uncontradicted in the record, we are unable to understand complainant's claim of non-navigability along the streches involved in this suit. If the Colorado River below the foot of Black Canyon is navigable in law and in fact as claimed by complainant in this suit, and also in the suit now pending in this Court wherein the State of Arizona is complainant and the States of California, Nevada, Utah, New Mexico, Colorado and Wyoming, together with Ray Lyman Wilbur, Secretary of the Interior, are defendants (No.

19 Original), it is obvious that upon complainant's own interpretation of the evidence in this suit, all sections of rivers here in controversy are navigable in law and in fact.

As appears on page 134 of complainant's brief, Howard estimates that during a twelve-month period "131,000,000 tons of suspended matter was carried in Colorado River past Lees Ferry". In his report entitled "Suspended Matter in the Colorado River in 1925-28", Water-Supply Paper 636-B at page 24, he estimates that during a twelve-month period 443,000,000 tons of suspended matter was carried in the Colorado River at the Grand Canyon, and during that same period 345,000,000 tons of suspended matter was carried in that river at Topock. Topock is a railroad station fifteen miles below Needles and about 206 miles above Yuma. In complainant's exhibit No. 68, same being the report of Fortier and Blaney, it is said at page 22, that Topock "was considered the best available site near the lower end of the canyon section of the river affording an opportunity to observe the discharge and the percentage of weight of suspended silt". On page 24 of exhibit No. 68, the estimate of suspended matter in the Colorado River at Topock for a twelve-month period is given as 205,763,200 tons. However, if Mr. Howard's estimates are "based on much more complete basic information than was available to Fortier and Blaney", we should perhaps accept the larger estimate of silt content given in his report.

It is a matter of common knowledge that below the foot of Black Canyon, the Colorado River, generally speaking, flows through a flat, desert country, unconfined by canyon walls, with a very wide channel along

portions of its course. One of the objects of the proposed dam is flood control. At page 23 of Exhibit No. 68, it is said: "The width of the river channel under *normal* discharge below Topock varies from a few hundred feet to about half a mile; that of the canyon section varies from about one to twelve hundred feet with the exception of a short stretch along Virgin River. In general the river is only a few hundred feet wide in the canyon section."

The topographic maps of the U. S. G. S. show the average gradient to be 1.58 feet per mile on the lower Colorado, although at page 23 of Exhibit No. 68, the gradient is given as 1.5 feet per mile.

At page 29 of Exhibit No. 68 appears the statement that the delta of the Colorado River extends "from the present head of the Gulf in a northwesterly direction about 140 miles and is from 10 to 40 miles wide." On page 190 of complainant's Exhibit No. 58, Water-Supply Paper 395, it is said that at low stages the river winds through the delta in a channel "fairly well defined by banks 10 to 12 feet in average height; at high stages it overflows its banks at many points".

We here quote from said report of Lieutenant Ives (complainant's Exhibit No. 72 at pages 9-10):

> "It is about one hundred and fifty miles by the river from the head of the Gulf to Fort Yuma, though only half that distance in a direct line. Concerning no particular locality can any special information be given that would be of value to the navigator. The shifting of the channel, the banks, the islands and the bars is so continual and so rapid that a detailed description, derived from the experiences of one trip, would be found incorrect, not only during the subsequent year, but perhaps in the course of a week, or even a

day. * * * The bars are yielding, and any agitation upon their surface causes them speedily to wash away. A boat may frequently be forced over places where there was, at the time of its striking, six or eight inches too little water. * * * For several years the Colorado has been regularly navigated by steamboats between its mouth and Fort Yuma. At low water, trips are rarely made without the boat grounding many times a day. A sounding pole is constantly employed. Different points upon the bar are tried till the least difficult is found. The steamer is then worked backwards and forwards to loosen the sand. Lines are attached to a tree, snag, or to an anchor taken out ahead, and are heaved upon with the windlass or capstan. As a last resource, the boat is lightened of a portion of the cargo, and by these expedients the bars may always be passed, with more or less difficulty and delay. * * * Experience alone can impart the knowledge required to enable one to navigate successfully. Memory assists but little in selecting the channel, for it has been known to change from one bank to the other in a single night. Generally along a steep bank and a concave bend the deepest water is to be found, but the rule is not invariable. The water being turbid and perfectly opaque, it is impossible to determine the depth as in the case of a clear stream."

In view of the vastly greater silt content of the river at the foot of Black Canyon as compared even with silt load at Lees Ferry, and having in mind the further uncontradicted fact that the stream is much wider and is practically unconfined in channel through most of the distance from Black Canyon to the Gulf, it would necessarily follow that the channel would be more shifting, sand bars more frequent and troublesome, depths of water more shallow and navigation

difficulties much greater than along either of the stretches here involved. Neither Virgil Baldwin nor any other of the most extreme witnesses for complainant painted a picture of navigation difficulties remotely approaching those described by Lieutenant Ives.

We respectfully submit that complainant should not be permitted to shift standards of navigability to suit its momentary purpose.

INDIAN RESERVATIONS ADJACENT TO THE RIVERS.

The Executive Order referred to on pages 88-91 of complainant's brief is a part of complainant's Exhibit No. 71. In that same exhibit is the Executive Order of President Harrison issued in 1892, four years before Utah became a state, vacating the Order in so far as it affected any lands west of the one hundred and tenth meridian, which meridian crosses the San Juan River approximately 117 miles east of its junction with the Colorado River. By the Order of President Harrison, all lands west of said meridian were restored to the public domain, so that any section of the rivers here involved are now, and were at the time Utah became a state, far removed from any lands withdrawn for Indian purposes. It will be observed that the original Order of Withdrawal did not specify the Navajos or any other tribe of Indians as beneficiaries, and was silent as to the nature of the Indian purposes contemplated. Of course, it did not purport to be a grant for any purpose, and hence was in no way similar to the grant to the Osage Indians under consideration in the *Brewer-Elliott Oil Co.* case.

The probabilities are that when, in 1884, the President signed the original Order of Withdrawal, he had not the slightest knowledge concerning the navigable capacity of the San Juan or Colorado Rivers, and the question of their navigability probably never entered his mind.

UTAH'S TREATMENT OF THE RIVERS SINCE STATEHOOD.

Under the recording laws of Utah since, as well as before it became a state, the county recorder rests under the duty of recording any instrument purporting to affect the title to real property upon receipt of the prescribed fee. It is a matter of common knowledge that mining locations are made and notices thereof filed by prospectors on property of all kinds and descriptions, and regardless of the situs of the title at the time such locations are made. No one ever knows or cares anything about such records unless a controversy as to priority arises between different locators. We can not believe that complainant intends to seriously urge that the State of Utah failed to bring suit against these prospectors because it felt that the rivers in question did not have sufficient navigable capacity.

Mention is made of power site reservations and withdrawals for reservoir sites by complainant. It is not indicated how the matter of navigability of the streams has affected, or can affect, any action that has been taken by complainant with reference to power or reservoir sites. Even had complainant given its consent to a suit against it on account of what it has done in the premises, we are curious to know just what the allegations of the bill of complaint

would have been and what facts Utah could have alleged that would be sufficient to constitute a cause of action. We anticipate that the State of Utah, rather than the United States, will be most anxious to further any Government project looking toward the construction of reservoirs and the installation of power plants along the rivers within that State.

In answering that portion of complainant's brief filed with the Special Master which discussed the clause contained in certain oil leases issued by defendant, we said in our reply brief:

> "With reference to the language appearing in State leases requiring the lessee to defend suits that might be brought by the United States or those claiming under it, we invite attention to the fact that the anticipated litigation came. In this connection we will volunteer the information that had Defendant known that the present suit would be as expensive as it has proved to be the lessees would not have been relieved of their obligation in the premises for the comparatively trivial sum accepted by Defendant. What we have just said may be outside the record as it now stands, but, if Complainant is permitted to contend that these State leases are evidence that Defendant is not the real party in interest in this case, or that Texas Production Company, or any other company or individual, is conducting or taking any part whatsoever in this litigation, we shall ask leave to reopen the case for the purpose of refuting any such inference. The State leases were not received for any such purpose and evidence of any such fact would obviously be irrelevant."

We are informed that complainant intends to file in this Court a printed abstract of the record in narra-

tive form. A large package of loose leaves has been left with us, which doubtless contain the substance of the abstract to be filed. Because every moment of the time allowed for preparing, printing and filing this reply brief has been employed in that work, it has been utterly impossible for us to even scan the bundle of sheets so left with us. We trust that a more complete statement of the evidence in any abstract filed by complainant will better reflect the nature and substance of the record than that appearing in its brief.

CONCLUSION.

Each of complainant's exceptions to the Report of the Special Master is without merit. It should be adjudged and decreed herein that defendant is the owner of all portions of the beds of the Green River, Grand River and Colorado River, here involved, except the bed of that section of the Colorado River, located and extending between Mile 212.15 above Lees Ferry and Mile 176 above Lees Ferry.

Respectfully submitted,

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APPENDIX

TESTIMONY AS TO NAVIGABILITY.

Because the experience of most of the witnesses was not confined to one river or to one section of a river and in giving their testimony they speak of one river or a section of a river in one answer and in the next answer, or even in the same answer, refer to a different river or locality, it has seemed to us that it would confuse rather than aid the Court to attempt to segregate the different parts of the testimony of a given witness or to attempt, by employing geographical sub-titles or otherwise, to separately digest his testimony as to one river or as to a particular section of one river.

WITNESSES FOR COMPLAINANT.

Clyde L. Eddy testified: With a crew of nine college men, a camera man and one, Parley Galloway, I left Green River, Utah, on June 27, 1927, with two 22-foot boats having a 5-foot beam; also a 16-foot boat. (R. 39-44, Vol. 1.) Galloway had formerly made a trip on the river but no other member of the party had ever before been on the river (R. 76, Vol. 1.) At a point five to eight miles downstream from the town of Green River, at a sharp bend in the river, we encountered some difficulty. (R. 44, Vol. 1.) However, we got safely through with all three boats. (R. 76, Vol. 1.) We ran into sand bars at a number of places between the town of Green River and the mouth of the Green River. (R. 45, Vol. 1:) Except for the rapid water at the place mentioned where there was a sharp bend in the river, no other rapid water was encountered until the party reached No. 1 Rapid at the head of Cataract Canyon. (R. 75, Vol. 1.) After going through Cataract Canyon, we had easy going on down to the Utah-Arizona line. There are comparatively few streams that in the course of

fifty miles do not have riffles and more or less rapid water, but through that stretch the party had "easy going" (R. 77, Vol. 1.) and got through without any mishaps. Neither I nor any man experienced in boating would have any hesitation about going over any water in that stretch. In going through Cataract Canyon we lined the boats and portaged the cargo on four occasions. On the first occasion the load was portaged for a distance of one-half to three-quarters of a mile; on the second occasion, for practically a mile; on the third occasion, three-quarters of a mile; and on the fourth occasion, not to exceed a quarter of a mile. (R. 78-81, Vol. 1.) The trip was made at a high stage of water. In my judgment, with the water at the stage it was when I took this trip, I could go up the Colorado River in a motor boat from Lees Ferry to Cataract Canyon. (R. 97, Vol. 1.) Starting from the head of the first rapids in Cataract Canyon, I believe a motor boat could have made the journey up the river to the confluence of the Green and Colorado Rivers and thence up the Green River to the town of Green River; this could have been done without any insurmountable difficulties. Although there would have been plenty of trouble with sand bars and rocks, those dangers could be successfully avoided if the persons in charge of the boats knew their business, and I am sure that it could be done. (R. 98, Vol. 1.) The process of lining boats around rapids is equivalent to the old portage with lighter boats. (R. 99, Vol. 1.) The trip from the town of Green River to Lees Ferry consumed about sixteen days. (R. 74, Vol. 1.)

Arthur A. Baker of the U. S. G. S. testified: I made a trip in a small boat equipped with an Evinrude motor from Moab to the oil well twenty-eight miles below, and on another occasion made the same trip in a slightly larger boat belonging to the Moab Garage Company. On the first of these trips I knew nothing about the channel and frequently ran on

sand bars. On the second trip the boat was operated by Virgil Baldwin who was able to pick the channel but had to watch carefully. (R. 110-12, Vol. 1.) During my first two years at Moab the Moab Garage Company was operating boats throughout the entire period, making trips every few days; while they were running one boat they made possibly two trips a week, and for a time they ran two boats. I would say that they made more than one hundred river trips, carrying oil equipment and supplies during that time. (R. 113-15, Vol. 1.) I did not go to the oil wells in an automobile because it would have been a very arduous task to reach the places to which I wanted to go in that manner and I desired to observe things along the river (R. 124-5, Vol. 1.)

William Glen Hoyt of the U. S. G. S testified: I went from Washington, D. C. to Green River, Utah, for the purpose of making the examinations to which I refer in my testimony, arriving at Green River on September 27, 1928 (R. 271-2, Vol. 2), accompanied by Mr. Moyer, one of the attorneys of record in this case. (R. 278, Vol. 2.) I knew that the sole purpose of our trip was to bring back facts from observations on the ground that would bear on the question of navigation up and down stream. (R. 298-9, Vol. 2.) At the mouth of the San Rafael we loaded about one-third of our supplies in a canoe and the remainder in a row boat. (R. 183, Vol. 2.) Below the mouth of the San Rafael there is a uniform slope of between one and two feet to the mile; "there are no riffles, no rapids, and no breaks in the general surface of the water." "With our small boats there was no great trouble on the bars. Every time we got on a bar we would push off." (R. 184, Vol. 2.) From the mouth of the Green we went up the Colorado River, a large motor boat of the Moab Garage Company taking some of our party, and Mr. Blake and I using our row boat, in which we had come down the Green, which row boat had an outboard motor. The large

motor boat towed our canoe. (R. 211, Vol. 2.) That boat had a draft of two and half feet. (R. 195, Vol. 2.) Going up the Colorado we made approximately 2.4 miles an hour, including stops necessary to take pictures, fill the tank of our outboard motor and waiting for the other boat. The big boat was stuck at a few points for a time and our small boat was stuck on a bar occasionally. (R. 213-4, Vol. 2.) In my report (Complainant's Exhibit No. 75), I specified one or two places that the boat got stuck, but from a technical viewpoint it might have been as well for me to have omitted those references, except as they show the character of the bed of the river. (R. 300, Vol. 2.) With the same boats, loaded and propelled in the same manner, I would say that one would encounter the same type of sailing going up or down the Green between the mouth of the San Rafael and the mouth of the Green and between the town of Moab and the mouth of the Green; it would be as easy to go up or down one of the streams along those sections as to go up or down the other. (R. 300, Vol. 2.) We had very much more trouble with bars on the Colorado River than on the Green River. (R. 285, Vol 2.) We reached the confluence of the two rivers on October 14, 1928, and the Green River was at its lowest stage for the month during the period from October 1 to October 12. (R. 293, Vol. 2.) I made a survey of the bars and riffles mentioned in my report. I have read the 1909 report of the Army Engineers (Defendant's Exhibit No. 18), and have examined each of the bars and riffles therein mentioned. We had no difficulty in locating those bars and riffles, which are listed in their proper order, with approximate mileage. (R. 303-5, Vol. 2.) I had no difficulty in locating the bars and riffles mentioned in the Army Report at the places therein indicated, notwithstanding the fact that there have been many floods and much high water since 1909. (R. 306, Vol. 2.) The soundings recorded in my report merely represent the depths I happened to get

as our boat travelled down stream. (R. 319, Vol. 2.) When I say in my report that the channel depths as we found them were from three to five feet and tapering to zero, I mean tapering to the point where a bar was exposed. (R. 322, Vol. 2.) Over a period covered by long-term records there has never been a time when the Green River was dry, and regardless of where the channel lies from year to year, the amount of water would average more or less the same at each corresponding month in the year. The large flat bottom scow of the Moab Garage Company has been down the river during the periods of the year when weather conditions are the same as when I was there and they could go down the Colorado and back and could probably go up and down the Green River between the mouth of the San Rafael and its mouth with that boat. (R. 348, Vol. 2.) I was operating the canoe, and while I got stuck, the canoe would always have got through if I had known enough to find the channel. (R. 349, Vol. 2.)

Mr. Hoyt's trip on the Green River down to the head of Cataract Canyon and thence up to Moab is his only experience on either of the rivers here involved.

John J. Lumnsden testified: I live in Grand Junction. In 1905, I built a boat that was called the City of Moab; it was about 50 feet long, 16 or 18 feet wide, had several cabins, and its draft according to my best recollection, was from 12 to 14 inches; it had a marine gasoline engine and was designed to haul freight and passengers from Green River, Utah, down the Green River to its mouth and thence up the Colorado to Moab and return. There were about ten in the crew and we left Green River, Utah, with our supplies on board. (R. 664-6, Vol. 4.) The first day we got down pretty close to the mouth of the San Rafael and ran on to a sand bar, and after we got off that sand bar continued to a point 4 or 5 miles below the mouth of the San Rafael and camped.

(R. 667, Vol. 4.) We had trouble getting through what they called the Gimlet, where we touched the banks or rocks, but after getting through there we came into more quiet water and got along very well between there and the mouth of the Green River, except that we encountered sand or gravel bars in several places. (R. 668, Vol. 4.) We were hung up several times, maybe for two or three hours, maybe an hour. (R. 669, Vol. 4.) Our boat was not capable of making it up the Slide on the Colorado River, so we turned around and came back up the Green River. The water was very high at this time, it being during the spring run-off. (R. 670-1, Vol. 4.) We tied the boat up at the Wolverton or Halverson ranch, some 10 or 12 miles below Green River, Utah. (R. 673, Vol. 4.) The cabins on the boat were about 7 feet high. (R. 681, Vol. 4.) The reason we couldn't go up the Slide was that we didn't have enough power. (R. 684, Vol. 4.) I concluded that I couldn't make money operating the boat. I think we investigated as to whether the traffic that we could get would meet our operating expenses and yield a fair return on the investment, and when I received an attractive proposition for using the boat on Great Salt Lake, I decided that was a more profitable field. (R. 760-2, Vol. 4.)

Charles Warner Anderson testified: I helped build the City of Moab, which was equipped with two 25-horsepower engines. It was a double decker with six cabins on each side. (R. 721-2, Vol. 4.) Before my trip in the City of Moab, I went with two other men from Green River, Utah, to Moab in a 16-foot boat with two sets of oars. We hit some sand bars between the mouth of the San Rafael and the mouth of the Green, but had no particular trouble going up the Colorado River to Moab except hard rowing. We went up the Slide without noticing it. This trip consumed ten days. (R. 724, Vol. 4.) We were about four or five days going from Green River, Utah, to the junction of the rivers. (R. 728, Vol. 4.)

Our trip back up the Green River with the City of Moab was practically the same as going down, only it was not so hard because we could back off the sand bars. We encountered no sand bars in Stillwater Canyon, and there was plenty of water there, but did get on bars in Labyrinth Canyon and had some trouble at the mouth of the San Rafael. (R. 732-3, Vol. 4.) Next fall, I again saw the City of Moab after it had been remodeled. We went down as far as Valentine Bottom, located about a hundred miles below the town of Green River in the remodeled boat. They had put in a new engine and a stern wheel and had made the boat 10 feet longer. We used coal as fuel. The stern wheel helped us in getting off sand bars, but our trip was much like the former trip. (R. 735-8, Vol. 4.) I can't say whether the channel of the river changed but the sand shifted about. We did not have very much trouble coming back upstream from Valentine Bottom until we reached the gravel bars. (R. 739, Vol. 4.) When I made the trip up to Moab in the small boat and made soundings, I arrived at the conclusion that there would be no serious difficulty in operating the City of Moab on the two rivers. That trip was made at low water, and at that same stage of water we would have had no difficulty in going up through the Slide with the City of Moab. (R. 743-5, Vol. 4.) When we made the trip in the remodeled boat, our objective was Valentine Bottom, and when we reached that objective we turned around and came back with only the incidental difficulties I have mentioned. (R. 746, Vol. 4.) I cannot tell whether the channel of the river was in the same place on my second trip as it was on my first trip; that is a difficult thing for any one to do. (R. 751-3, Vol. 4.) The remodeled boat was called The Cliff Dweller and was of the same draft as the City of Moab. (R. 754-7, Vol. 4.)

Ellsworth L. Kolb testified: In September, 1911, my brother and I left Green River, Wyoming, with

two flat bottom 16-foot row boats. (R. 764-5, Vol. 4.) Between Green River, Wyoming, and Green River, Utah, we noticed different ranches in different sections where boats were tied up to the shore. (R. 786, Vol. 4.) We made the 24 miles odd to Wolverton's ranch in one day. (R. 786, Vol. 4.) Between the San Rafael and Labyrinth Canyon we frequently ran on to sand bars. Each of us when rowing would be facing upstream, but we would look over our shoulders and pick out what we thought were the deeper channels. (R. 788-9, Vol. 4.). If we had had some one in the stern who could have kept a lookout, it would have helped. We did not have much trouble in Stillwater Canyon. (R. 790. Vol. 4.) We ran every rapid in Cataract Canyon without lining either of our boats and without any mishap. (R. 792, Vol. 4.) I recall no difficulty in Narrow Canyon, but from there on down we frequently climbed out to make pictures. (R. 796, Vol. 4.) We saw three men at Hite and there were three cabins within a few miles of each other. We also saw Bert Loper in a boat. (R. 799, Vol. 4.) He had a placer dredge there and some stock. At Warm Creek we noticed twenty men engaged in building a flat bottom steamboat. (R. 800, Vol 4.) We left Green River, Wyoming, on September 8, 1911, and arrived at Green River, Utah, October 16. We left Green River, Utah, October 19, and arrived at the mouth of the river October 26. We left there on October 26, and arrived at Lees Ferry on November 6, 1911. (R. 809-10, Vol. 5.)

On September 11, 1921, I again began a river trip, leaving Green River, Utah, on that day with the U. S. G. S. and Edison Electric expedition for the purpose of making a survey of the river for dam sites. (R. 812, Vol. 5.) There were ten men in that party. We had two 18-foot boats with a 4½ foot beam and a third boat equipped with an outboard motor. (R. 816-20, Vol. 5.) We had some trouble scraping rocks in the riffles directly below Green River. (R. 822, Vol. 5.) After we left the mouth of the San Rafael,

my notes show that we hit one sand bar. (R. 823, Vol. 5.). Sometimes we knew there was a channel, but because of the speed of our motor propelled boat we didn't have a chance to reach it and would run onto a sand bar; but more often it was because we did not know just where the channel and deep water was. We had less trouble in Stillwater than in Labyrinth Canyon. Below Double Bowknot we overtook my brother and tied his boat on one side and one of the other boats on the other side of the motor boat and propelled them all with the one outboard motor. We arrived at the mouth of the Green River on September 15. From the junction of the rivers down to the first cataract in Cataract Canyon, I recall having no trouble with said bars. (R. 824-6, Vol. 5.) The rapids in Cataract Canyon change very little, and I found conditions about the same as in 1911. (R. 830, Vol. 5.) We did not line the boats through Cataract Canyon except at the rapid in Dark Canyon. (R. 832, Vol. 5.) One boat was stuck on a rock and was over turned while pulling it to shore. Cataract Canyon is exceptional in that it is possible to take a boat out at every rapid and get it around the rapid if you wish to do so. (R. 836-7, Vol. 5.) From Narrow Canyon to the mouth of the San Juan we encountered about the same incidents as on my former trip. (R. 841, Vol. 5.) Tom Wimmer met us in a motor boat a short distance above Hall's Crossing; he was engaged in delivering supplies to the government engineers. (R. 845, Vol. 5.) Wimmer is a river man and always had boats scattered at different places. (R. 847, Vol. 5.) From the mouth of the San Juan to Lees Ferry we had two boats carrying 1500 pounds of supplies. We encountered sand bars where the boats would get stuck for a short time, but we would push them off. (R. 850, Vol. 5.)

Henry E. Blake testified: Bert Loper and I made a boat trip up the Colorado River to Hole-in-the-Rock, from the mouth of the San Juan River in 1921, and

all the party came back with us in the boat to our camp at the mouth of the San Juan. (R. 891, Vol. 5.) In boating from the mouth of the San Juan down to Oak Creek we had no great difficulties and I do not recall any special instance where we were stuck on sand bars so that we had to get out and push the boat. Then we continued on to Lees Ferry. (R. 892, Vol. 5.) In that stretch we were at one place stuck on a mud bar as a result of my poor judgment. The survey party left Bluff on July 18 or 19, 1921, and the date of our arrival at Lees Ferry was the 19th of December, 1921. (R. 893, Vol. 5.) While working on the survey, supplies were delivered overland to the party. (R. 894, Vol. 5.)

In 1928 I accompanied Mr. Hoyt on his trip from Green River, Utah, to Moab. (R. 911, Vol. 5.) The large motor boat that me us at the junction made it up through the Slide very easily. (R. 924, Vol. 5.) Our boat encountered a submerged bar there, so that I had to drift down and when I started up again had no difficulty in getting through. (R. 925, Vol. 5.) When I made my first trip from Green River to Moab in the gasoline launch there were several others in the party and we had our beds and supplies on board. (R. 931-4, Vol. 5.) My father has owned and operated two power boats that I know of on the river. (R. 935, Vol. 5.) The 1909 trip was taken at comparatively low water. (R. 936, Vol. 5.)

On my trip with Mr. Hoyt I purposely put my boat in a position where Mr. Hoyt could see and study a bar and on a great many occasions started the boat on to a bar for this purpose. (R. 938, Vol. 5.) On my trip with Mr. Hoyt down from Green River, Utah, to the San Rafael, the water was lower than it had been since the spring flow-off. (R. 944, Vol. 5.) Mr. Marrs brought supplies in a government boat from Lees Ferry to a point near Aztec Creek located about 9 miles below the mouth of the San Juan. It was a 24-foot motor boat with several men in it. (R. 947-8, Vol. 5.)

We had less trouble on the journey I took with my father and his party in 1909 than on my trip with Mr. Hoyt in 1928. (R. 952, Vol. 5.)

R. C. Clark testified: I live at Moab; am an owner of Moab Garage Company which is engaged in the transportation business. We file our schedule of rates with the Public Utilities Commission of Utah. My company operates a scow on the Colorado River; it is 15 feet wide, 75 feet long and 3 feet deep from gunnel to the bottom. The first engine we used in this scow was an automobile engine. Empty its draft is 4 inches and with a 15-ton load the draft is 20 inches. I have personally been down the river on that scow and had no difficulty in operating it on any of the trips when I was along. It did not get stuck on any sand bars on the five or six trips I have taken. (R. 959-63, Vol. 5.) Between March 2, 1925, and June, 1929, that boat has made from 245 to 250 trips, eight of which have been made this year and there are prospects of further freight. We expect that another well will be drilled down there. I am familiar with the bed of the Colorado River from Castle Creek to the junction and have been on the river in all kinds of boats, motor boats, row boats and sail boats. Our scow has never been farther down than Lockhart, about 40 miles below Moab. In my river experience with row boats and motor boats, I have encountered sand bars which are generally found in the same place. They can usually be avoided and I have not been stuck on them for any length of time. (R. 964-6, Vol. 5.)

I recall the Undine, which was 60 feet long, with a round bottom and propelled by steam. It drew about 18 inches of water. I don't know how many trips it made before they started to go up the river from Moab to Cisco. At Nigger Bill riffle the boat got sidewise in a riffle and turned over. (R. 966-7, Vol. 5.) Since I started to operate boats on the river I have taken whatever business was offered. I have

had four boats in operation at the same time, three power boats and one boat with an outboard motor. I supply the various oil companies with my service. For transportation of freight alone the various companies operating below Moab have paid me approximately $40,000. In addition to our freight operations we have had quite a little passenger traffic and have taken parties up and down the Colorado to its confluence with the Green. (R. 971, Vol. 5.) We have run advertisements for sightseers and have invited traffic on our boats from sightseers. Since 1925 we have made from two to three hundred trips with our boats carrying passengers only. (R. 973, Vol. 5.) I have been there on the job as manager all the time and have kept in touch with the trips and the freight carried. During all of the period in which we have been engaged in freight and passenger transportation on the river there has been no serious incident occur in the way of interference with navigation. Our gasoline launches that we have operated in commercial service are: one boat 22 feet long, 6 feet wide, with a screw propeller; one boat 18 feet long and 8 feet wide; and another boat 18 feet long and 4 feet wide. We used our boats other than the scow for taking small loads on rush trips. (R. 974, Vol. 5.) The Midwest Oil Company operated boats on the river, plying up and down between its wells and Moab. The Texas Oil Company had a motor boat. The government has had boats with outboard motors, operating up and down the river from Moab. (R. 975-6, Vol. 5.) Defendant's Exhibit No. 4 is a picture of another of our boats. Defendant's Exhibit 3 is similar to a boat of the Utah Petroleum Company. (R. 976, Vol. 5.) Defendant's Exhibit 1 appears to be our pier at Dock No. 1. (R. 975, Vol. 5.) We operated our boats, leaving on a schedule at a certain time every day while the oil operations were in progress. A lot of people from all over the country took the trip to see the wells and others were interested in oil structures down there. This was

mostly in December, 1925, and January and February, 1926, but we have had a little passenger transportation all of the time until our last shutdown. If oil should be discovered farther down the river, say down toward its junction with the Green River, the oil men would get their supplies down there by boat. (R. 979, 981, Vol. 5.) We have taken 15 or 16 tons at a time on the big boat. (R. 988, Vol. 5.)

Harold W. C. Prommel testified: I am a geologist and mining engineer and in 1920 went to Moab to study the geology of that section. (R. 989-991, Vol. 5.) I made the location for Shafer No. 1 Well. (R. 997, Vol. 5.) I recommended to my employers that in drilling that well they use river transportation because it was cheaper during the exploration period and also quicker. (R. 1003-4, Vol. 5.) In the event that it turned out to be a commercial field, I believe that it would be more economical to construct a road. (R. 1007, Vol. 5.) I made a trip from Moab to Shafer No. 1 Well (R. 1035, Vol. 6), and we got stuck on a sand bar going down. On the upstream trip I believe we struck a sand bar once. (R. 1036, Vol. 6.)

John Galloway testified: I have boated on the Green River from almost its starting point to Lees Ferry and on the Grand River from Westwater to the mouth of the Green. (R. 1041, Vol. 6.) In April or May, 1926, my brother and I went from Westwater to Moab in a 16-foot row boat with a 5-foot beam, drawing only 4 inches of water loaded. From Westwater Canyon down the water was sluggish in places and in other places would break over little riffles. (R. 1040-5, Vol. 6.) I think I could take a row boat up from Moab to Westwater Canyon but could not row all the way up. (R. 1045-6, Vol. 6.) In February or March, 1925, my brother and I, with the same boat I have mentioned, went from the mouth of the Green River up to Moab, consuming five days

in reaching Shafer Well No. 1, where we put our boat on to the big motor boat and rode up to Moab. (R. 1047-9, Vol. 6.) It is not difficult to row a boat up through the Slide on the Colorado and we did so, but we probably towed the boat two-thirds of the distance upstream. (R. 1050, Vol. 6.) We would row where it was not convenient to reach and pull the boat with our tow line. When we were riding on the big barge it had a little trouble at a sand bar just below Moab. (R. 1051, Vol. 6.) In December, 1927, my brother and I made a boat trip from the Junction up to Lockhart. There was ice running in the river, so we left our boats there, walked up to Oil Camp No. 1, where we took pasasge on the Moab Garage boat to Moab. I recall no difficulty encountered by that boat on that trip, although it seems to me we kind of stuck on bars two or three times. The floating ice didn't seem to bother it. (R. 1053-4, Vol. 6.) In February following we went back to Lockhart and trapped for beaver the rest of the winter between Lockhart and Moab. (R. 1055, Vol. 6.) On my different trips on the Green River I have noticed some difference in the channel of the river, but those changes do not occur frequently in that stretch of the country. (R. 1058-9, Vol. 6.) The Green River does not freeze over every winter in that section, and I do not believe the Colorado River freezes over above the mouth of the Green in that region. (R. 1060-1, Vol. 6.) I have prospected through Glen Canyon in two different years, and on one trip hauled our lumber to North Wash, about 4 miles below the mouth of the Dirty Devil, and there built our boats. (R. 1062, Vol. 6.) In the stretch of the Colorado between Cataract Canyon and Lees Ferry there is some difficulty in different places; it is about the same as the upper Colorado, except that you have more water. Occasionally, but not frequently, there are twisting currents in the nature of whirlpools. (R. 1068, Vol. 6.) My father, Nathaniel Galloway, used to do a lot of trapping on the San

Juan, Colorado and Green Rivers, which he went up and down, following his vocation; I suppose he went up in places. I know he went all the way down on those rivers. (R. 1074, Vol. 6.) I do not remember father's ever having any motor boat; the old trappers seemed to depend on the old style of navigation. (R. 1076, Vol. 6.) I don't particularly mind going up the Colorado River, although it is hard work, as it is rowing upstream on any river. (R. 1081, Vol. 6.) I had no more difficulty in going from the mouth of the Dirty Devil down to Lees Ferry than I had in going from the mouth of the San Rafael to the mouth of the Green River. (R. 1107, Vol. 6.) I know there is a big Indian reservation on the Snake River, the Blackfoot Reservation, and I don't remember ever seeing an Indian with a boat on the Snake River. (R. 1116. Vol. 6.)

Parley Galloway testified: I have made four or five trips from Green River, Utah, to the mouth of the Green River and I have always found the location of the sand bars the same in that section of the river. I had trouble with sand bars nearly all along that section. (R. 1126, Vol. 6.) On the first part of the Eddy trip we had considerable trouble; none of the party had ever had any experience in navigation. (R. 1127, Vol. 6.) In going through Glen Canyon with the Eddy party we did not have a great deal of trouble, although we found sand bars and nearly every day some of the boats would get stuck on a sand bar; and when we took Howland through Glen Canyon we had some difficulty with sand bars. (R. 1130, Vol. 6.) In my opinion you could not take a boat from Moab up to Westwater but you could go from Moab up 10 or 15 miles. (R. 1133, Vol. 6.) There are some riffles there that I do not believe a man could row over but he could row over those and go on up. (R. 1134, Vol. 6.) I was probably 15 years old when I took a trip through Cataract Canyon with my father. I don't recall whether or

not we lined our boat. It was a prospecting and trapping trip to Lees Ferry. When you are traveling with a row boat, especially upstream, on any river that I am familiar with, it is much easier in certain stretches to get out and tow the boat than to row. (R. 1140-1143, Vol. 6.) Because none of the other members of the Eddy party had had any prior experience with boats or with the river, we encountered quite a bit more trouble than otherwise would have been encountered on the early portion of the journey. (R. 1145, Vol. 6.)

Virgil Baldwin testified: I have operated three small boats and one large boat on the Colorado River. One boat was 27 feet long, 5 feet wide, and drew 10 inches of water with ordinary load; it had a 6 cylinder automobile engine. Another boat was 20 feet long, 4 feet wide, with a draft of 6 or 8 inches of water and was powered with a Ford motor. Another boat, called the Black boat, was 18 feet long, 3½ feet wide, and drew 10 inches of water. The big boat was 75 feet long, 14 feet wide, and equipped with an automobile engine. It had an 8-foot paddle wheel that was 12 feet across and contained twelve paddles. At the rear that boat probably drew 18 inches of water and when loaded its draft would be two or three inches greater. My first experience on the Colorado River with these boats began in February, 1925, although I had formerly taken a trip or two for pleasure in an Evinrude boat. (R. 1155-61, Vol. 6.) In 1925 I made 80 or 90 trips with the big boat; in 1926, about that many more; during 1929 I probably made 25 or 30 trips, and other trips were made in 1927 and 1928. There were probably 150 or 200 trips all told. (R. 1163-4, Vol. 6.) We started in March, 1925, and ran steadily for five months, with occasional trips from that time on during that year. Next year we made trips during most of the months of the year every few days. In 1927 and 1928 there weren't so many trips. In 1926 we made trips dur-

ing each month of the year. (R. 1164, Vol. 6.) Our load would average between 12 and 15 tons during a part of this period. (R. 1165, Vol. 6.) We did not always find the deep water and its location would change in the course of three or four days, especially if we were not running. Every change in the stream flow caused a rearrangement of the sand. (R. 1166, Vol. 6.) We had more trouble in operating the boat at low water. (R. 1167, Vol. 6.) Ordinarily if we ran on to a bar going upstream we could back off it, but often it was more difficult going upstream because we could not handle the boat. (R. 1168-9, Vol. 6.) During high water we occasionally encountered sand bars. If we had no trouble going downstream we would make the trip to Shafer No. 1 Well in about two hours and a half, a distance of 19 or 20 miles; the return trip would take about 6½ or 7 hours, sometimes longer. Seventy-five per cent of the time we would have trouble with sand bars. (R. 1169-70, Vol. 6.) The longest time we were ever stuck was a day and a half at a point 1½ miles below No. 1 Well, where the river divided into four parts, no one of which was deep enough to float the boat; that was in August, 1926. (R. 1170, Vol. 6.) We were stuck many other times for as long as an hour to four hours. The longest time we ever took going up to Moab from No. 1 Well was ten hours. (R. 1171, Vol. 6.) The troubles that I have detailed occurred during July, August, December and January, when the water was at its lowest stages. (R. 1177, Vol. 6.) We also had trouble during other months, including trouble with floating ice during January, February and March. (R. 1178, Vol. 6.) If we hadn't been on the river for a day or two or a week, we would have members of the crew up in front taking soundings, which would help quite a bit; but if we were running regularly there "wouldn't be much for the other men to do, because running regularly I would know very near where to go; but I would kind of get off my course lots of times and get stuck."

(R. 1181-2, Vol. 6.) During the winter of 1924-5 the river froze over between December and the following March, but it has not frozen over since then and such an occurrence is unusual. In January, 1926, there was an ice jam that prevented us getting through. (R. 1192, Vol. 6.) The tonnage of freight carried on the big boat would average 10 or 11 tons a trip going down and about the same tonnage on the upstream trips. (R. 1200, Vol. 6.) In operating the big boat I would say that 25 per cent of the time we had no difficulties going either up or downstream; 50 per cent of the time we had no difficulties that would tie us up for more than a few minutes; and 25 per cent of the time we would have difficulties that would delay us five or six hours, except three occasions when the delays were longer than that. (R. 1208-10, Vol. 6.) All of the boats concerning which I have testified were run for commercial purposes and for the profit to be made in the operation. (R. 1215, Vol. 6.)

Lieutenant-Colonel Elliot J. Dent testified. I am in the Corps of Engineers, U. S. Army, have had experience on many rivers of the United States, and between September 25 and October 4, 1929, examined the Colorado River. (R. 1217-18, Vol.7.) I went down the Colorado from Moab to Cataract Canyon; thence up the Green River 5 miles; thence back to the confluence and up to Moab. The bed of the Colorado is quite permanently located between rock banks, with small opportunity to move sidewise more than a few hundred feet or as much as its full width. Within these limits the bed is very changeable. With few exceptions the bars had small trees on them, generally not older than 20 years. (R. 1227, Vol. 7.) We left Moab on August 25, 1929, in the 27-foot power boat of Moab Garage Company, and I observed numerous groundings of the boat. (R. 1227-33, Vol. 7.) As compared with the lower Mississippi River the sand in the water of the Colorado was extremely

heavy. (R. 1244, Vol. 7.) I know of no other river in the United States comparable in character to the Colorado. (R. 1247, Vol. 7.) After examining this stretch of the Colorado I went overland to North Wash, leaving that point in a 16-foot boat with a 4-foot beam and a very pronounced keel, powered with an outboard 8-horsepower motor, on September 1, 1929. (R. 1252-1256, Vol. 7.) Between Mile 78 and Mile 74 I observed sand waves, the worst of which were 10 or 12 feet long, that is between crests, and about 3 feet in height, tapering down to nothing but the chop. We had no difficulty in getting through. (R. 1261-3, Vol. 7.) At Red Canyon (Mile 150) we saw a prospector with a skiff about 12 feet long but no other boats. (R. 1266, Vol. 7.) With the boats actually in use between Moab and the junction that section was much more navigable than Grand Canyon. (R. 1267, Vol. 7.) I was instructed by the War Department to assist in this case and understood the nature of the controversy here involved. (R. 1271-2, Vol. 7.) We left North Wash (167½ miles above Lees Ferry) at 1:30 p. m., on September 1 (R. 1277, Vol. 7) and arrived at Lees Ferry at 1:10 p. m. (R. 1282, Vol. 7) on September 4, (R. 1267, Vol. 7), making a side trip to Rainbow Bridge on September 3. (R. 1280, Vol. 7.) I was never before on that river and have never seen it since. (R. 1288, Vol. 7.) There was much more water in that section of the river below North Wash than on the section between Moab and the confluence. (R. 1290, Vol. 7.) Most of the western rivers carry sand in varying quantities and are subject to precipitation from melting snow and also from heavy rains in the late summer. The Missouri River below Kansas City, during freshets, builds bars, cuts banks and changes considerably, and if it was never dredged the maximum depth in low water over some of those bars would be 3 feet. (R. 1296-8, Vol. 7.)

Carrol Edward Dobbin testified: I am with the U. S. G. S. In 1926 I was on the Colorado from

Moab to the junction and up Green River one mile. (R. 1308-9, Vol. 7.) During that summer I was supervising four field parties, two of which were working south of the railroad line, and I had occasion to visit the country in the pie-shaped area south and lying between the Green and Colorado Rivers. (R. 1310, Vol. 7.) I took a trip down the Colorado to the junction with J. B. Reeside, Jr., between August 4 and 10, 1926, in a 16-foot Evinrude motor boat, in which we had two rolls of bedding, supplies for a week, at least 25 gallons of gasoline and our cameras and surveying instruments. We had sand bar trouble and got stuck at some places coming back upstream where we had no difficulty going downstream. We were examining the country, collecting fossils, noting its geology, taking photographs, and would stop two, three or four hours at a place. (R. 1318-23, Vol. 7.) This was my only boat trip on the Colorado River except one former trip from Maob down to the Shafer Well. If I had been familiar with the channel of the river I would in all probability have avoided a great deal of our trouble. (R. 1327-1334, Vol. 7.) I have no recollection of being stuck or encountering difficulty at any place coming upstream on this trip where we had met with no difficulty going downstream. (R. 1335, Vol. 7.)

Harry Aurand testified: I am a geologist employed by Midwest Refining Company of Denver. (R. 1338-9, Vol. 7.) I have gone by boat from Moab to the head of Cataract Canyon and also on the Green River from its mouth to Mile-post 34. I have been below Moab in a boat on five different occasions, twice on the big scow of the Moab Garage Company, once in another of their boats, and twice in a still different boat. My first trip was in a row boat and I had difficulty with sand bars. (R. 1348-50, Vol. 7.) On my trip in the smaller Moab Garage power boat we commenced to encounter trouble after leaving Mile-post 39, that boat having been towed by the big

scow up to that point. Going down on the scow and the smaller boat we encountered trouble with sand bars at eleven different places. (R. 1351-2, Vol. 7.) It was not necessary for any one to go overboard and push the boats off from the sand bars on either my Colorado or Green River boat trips. (R. 1354, Vol. 7.) The only oil permits in which my company was interested below the Shafer wells was at Indian Creek. (R. 1363, Vol. 7.) On the river trip I have described I made notations of difficulties in navigation after I passed Indian Creek clear down to 5 miles below the confluence and thence up to Mile 34 on the Green River, although my company had not even a prospective contract for drilling wells or any other interest in wells in the vicinity of Green River. (R. 1363-5, Vol. 7.) I have heard that my company was a defendant in a certain suit instituted by the State of Utah and Texas Oil Company against the Midwest Refining Company, Shafer and others. (R. 1368, Vol. 7.) One reason why I made notations as to navigability on the Green River was to determine whether we could bring supplies down from Green River to the junction and thence up to Indian Creek on the Colorado River by boat. (R. 1377, Vol. 7.)

Franklin A. Nims testified: I am 75 years old and on May, 25, 1889, left Green River, Utah, with the Robert B. Stanton expedition. There were sixteen in the party, which was to survey a railroad line down the Colorado River. We had 15-foot boats with a 3-foot beam and a depth of 2 feet and keel bottom. (R. 1382-3, Vol. 7.) Between Green River, Utah, and the mouth of the San Rafael we encountered rapids and gravel bars and about 2 miles below the town my boat struck a rock which knocked two holes in it; occasionally our oars would strike gravel, showing that it was shallow. Between the San Rafael and Labyrinth Canyon, we encountered some rapids with no damage to the boats except to spring some seams.

Once in a while we would run on to a sand bar, jump out and pull the boat off and go on. "All of the boats didn't do that; the boats in the lead would do that, and the others would attempt to steer clear of it by trying to find another current, or a current, in another place." We started with six boats, which were so heavily loaded that the water came within three or four inches of the gunnel. Thereafter we pulled ashore and made a raft, which the sixth boat towed with a part of our cargo on it. We encountered some sand and small rapids in the upper end of Stillwater Canyon, but after we came out of that canyon encountered no difficulty until we reached the head of Cataract Canyon. (R. 1397-8, Vol. 7.) We lost two boats in Cataract Canyon and broke up a third boat in order to get nails to make repairs on the other three boats. Mr. Stanton took five men with him to continue his survey and the remainder of the party, with two boats, went on down to the placer mines at the mouth of the Dirty Devil for provisions. (R. 1399-1400, Vol. 7.) There were from twelve to twenty miners scatterd along there and not more than a dozen buildings at Hite, which we called Dandy Crossing. (R. 1401, Vol. 7.) Below Cataract Canyon we encountered the Tickaboo Rapid, where one boat was damaged and repaired, and we had more trouble at Trachyte Rapid, where we stopped and repaired leaks. From Trachyte down to Lees Ferry we would strike rocks and could not find a defined channel. We also encountered sand waves and such a strong wind that it was hard to row against it. There was no rapid water below the San Juan but every few miles one of the boats would run on to a sand bar. (R. 1402-4, Vol. 7.) We drank the water of the Green and Colorado Rivers on this trip, although occasionally we would come across a spring. We didn't strain the river water, but at night the cook would dip up a bucketful and let it settle. (R. 1408, Vol. 7.)

On November 25, 1889, I left Denver for another

river trip. We shipped three 22-foot boats, with a 3½-foot beam and a depth of 22 inches, having a draft of from 15 to 18 inches loaded, to the mouth of Crescent Creek, located a few miles below the Dirty Devil on the Colorado River (R. 1409-10, Vol. 7), leaving that point in our boats on December 10. We visited Mr. Hite at his placer mine, also stopped at Smith Brothers' ranch, and there were placer miners working in the canyon. We had some trouble with gravel bars; more than on our first trip because the water was lower. (R. 1414, Vol. 7.) About two-thirds of the way down the river we would stop occasionally when we would see a sand bar and pan the dirt for gold. I wrote the articles appearing in Complainant's Exhibit No. 177 entitled "Miscellaneous, by Franklin A. Nims." I wrote the article contained in said exhibit which bears the description "Through the Colorado River," when the incidents of my trip were fresher in my mind than at the present time and when I had the benefit of my notes and diary. I refer to my journey from Green River, Utah, to the mouth of the Green when I say at page 258 in said exhibit,

> "We had a pleasant sail down the Green of one hundred and twenty miles, to its junction with the Grand, forming the Colorado." (R. 1433-4, Vol. 8.)

And the statement that I make on the same page of said exhibit, to wit,

> "In the beginning of Cataract Canon, we encountered our first real rapid * * *" (R. 1436, Vol. 8.)

is also a true statement.

My article "Through Mysterious Canons of the Colorado," after reciting that we had arrived at the

mouth of the Green River, correctly states the fact at page numbered 254 of said exhibit:

> "After overhauling and re-packing our cargo and establishing our points, we turned loose on our perilous journey * * * Six miles below, at the head of Cataract Canon, we struck our first real rapid." (R. 1438, Vol. 8.)

The perilous journey I referred to was through Cataract Canyon. (R. 1439, Vol. 8.) In another of my articles appearing on page numbered 74 of said exhibit, where I said: "Here ended the 'picnic' part of our trip; then followed in quick succession mishaps, loss of provisions, etc.," I referred to our trip from Green River, Utah, down to the head of Cataract Canyon as the "picnic." (R. 1440, Vol. 8.) On page numbered 75 of said exhibit I correctly record: "From this point (mouth of the Dirty Devil) to Lees Ferry, Arizona, one hundred and fifty miles, the trip was uneventful." (R. 1450, Vol. 8.) Also at page numbered 259 of said exhibit I make the following comment concerning the trip from Tickaboo down:

> "We now pushed out, and owing to the long stretches of smooth water, with very few rapids, we arrived at Lees Ferry, one hundred and fifty miles below, on the afternoon of July 2nd, etc." (R. 1444, Vol. 8.)

Leigh B. Lint testified: I was with the U. S. G. S. in 1921. A boat was brought to us overland at North Wash and we used it as far as Bullfrog Creek. We then went out to Green River, Utah, where we obtained three boats of the Galloway type and used them down the Green River and through Cataract Canyon, continuing our work until we picked up our old lines at Bullfrog. (R. 1467-8, Vol. 8.) Progress on the lower Colorado River survey was very slow because

we had to work on the side canyon up to a 3900 foot elevation. We had just one boat and encountered sand waves and shoals. It was necessary to go back and forth across the river in the boat and it took time to pick a channel. The main thing was that we were compelled to keep a lookout for sand waves so as not to be caught in them with our load. (R. 1470-2, Vol. 8.) When we brought the boats down the Green and made our survey through Cataract Canyon we had an Evinrude motor in one boat. It was 16 feet long, 4-foot beam, and drew about 10 inches when loaded with about 1000 pounds. The other boats were 16-foot boats with rounded sides. We left Green River in September and encountered a lot of shoals and several times someone had to get overboard to push the boats along. (R. 1479, Vol. 8.) This situation continued the same through Stillwater and Labyrinth Canyons. (R. 1480, Vol. 8.) From Stillwater Canyon to the head of Cataract Canyon, we encountered no difficulty except that just above the confluence we hit a sand bar and broke the propeller shaft of our motor. From there on we didn't use a motor. (R. 1481, Vol. 8.) I don't think we could have brought the same boats with the load they had, up the the river with that motor. (R. 1484, Vol. 8.) (Ellsworth L. Kolb testified concerning this same trip, especially the journey through Cataract Canyon.) The progress through Cataract Canyon was comparatively slow because we had to carry the line of traverse through at the same time we went through with the boats. (R. 1484, Vol. 8.) I believe there are talus slopes on one side or the other all the way through Cataract Canyon. (R. 1486, Vol. 8.) As soon as we got through Cataract Canyon, the Kolbs took all of the boats except one. I was again on the Green River in 1922, with the Trimble party but that expedition did not go below Green River, Utah. (R. 1490, Vol. 8.)

Frederick S. Dellenbaugh testified: I am 76 years old and am an artist and writer. In 1871 I joined

the second Powell expedition which began at Green River, Wyoming, and went thence down the Green and Colorado Rivers to the mouth of Kanab Canyon, Arizona. (R. 1514-15, Vol. 9.) We had three 22-foot boats with three compartments in each, having a draft of 18 inches loaded. There were ten in our party; four men in Major Powel's boat and three in each of the others. (R. 1517-18, Vol. 9.) Upon arriving at Green River, Utah, then known at Gunnison Crossing, we took on new supplies. Between Green River, Utah, and the mouth of the San Rafael there are no rapids; just swift water riffles which didn't amount to much as compared with rapids we had gone through farther up the river. (R. 1522-5, Vol. 9.) We left Green River, Utah (Gunnison Crossing), in July and, as I recall had no very serious trouble with groundings between there and the mouth of the San Rafael. We did have trouble with groundings in Labyrinth Canyon, but not in Stillwater Canyon. Only Major Powel had been on first Powell expedition. (R. 1527-8, Vol. 9.) Just below the San Rafael there were heavy rain storms and cascades falling into the river, but I recall no difficulty or change or rearrangement of sand bars as a result of these rains. Through Cataract Canyon and 10 miles of Narrow Canyon you have a very severe river, in one 20-mile stretch there being a fall of about 220 feet. (R. 1529, Vol. 9.) We often lined the boats and at times had to portage our cargo from a hundred yards to perhaps a quarter of a mile; we lost no boats in Cataract Canyon. (R. 1530, Vol. 9.) There was one rapid in Glen Canyon just below the mouth of the San Juan, but above that the water had been rather low and we encountered ledges running across the river which made it necessary for us to get out and wade and lift our boats over those ledges. (R. 1531, Vol. 9.) When we went through Glen Canyon a second time the water was high and we had no trouble with the ledges. We had trouble with a number of small rapids and shallows. I remember

no sand bars in Glen Canyon. Because the river was low we had to go with great caution over the rapids. (R. 1532, Vol. 9.) When we passed the mouth of the San Juan in the middle of October, 1871, that river, like the Colorado, was low; on my second trip there, about July 1, 1872, the water was exceedingly high. We had no trouble at the Crossing of the Fathers because the Indians had marked the shoal and we could see right where it was. From there to Lees Ferry we encountered no difficulty. (R. 1537-8, Vol. 9.) I never found any evidence of Indians having owned or operated boats on these rivers. (R. 1558, Vol. 9.) I have found no evidence that the Spaniards ever used any of these three rivers for navigation purposes. (R. 1569, Vol. 9.) There was extensive fur trapping in and about the Green River commencing about 1835 or 1840 and the furs were moved out of that country by pack train to St. Louis (R. 1570, Vol. 9.) With furs as with other commodities, the seller goes to the place where he finds a market. (R. 1571, Vol. 9.)

When I passed the mouth of the San Juan in October, 1871, the stage of water was quite low. When I wrote "A Canyon Voyage" (Exhibit No. 14), I had leisure and ample opportunity to consider the facts there recited. We saw no part of the San Juan River except its mouth. My statement that when I passed the San Juan in October, 1871, it was shallow and "some eight rods wide" was an accurate statement, although I did not get out and measure the stream with a tape. When I went past the San Juan on my next trip the water was high and that river and the Colorado were large streams. (R. 1572-4, Vol. 9.)

The statement made in my book (Exhibit No. 14) that our descent from Gunnison Crossing to the head of Cataract Canyon was without a rapid worth recording was correct from our point of view. Except for sand bars that stretch of water was quiet and easy sailing. We had no serious difficulty but oc-

casionally would strike a sand bar and have to get out and wade along. At times we had difficulty in locating the channel and if we got on a sand bar would push off into deeper water, which sometimes was a long ways off, but we had no serious delay or mishap. (R. 1575-6, Vol. 9.) We had no sand bar trouble in Stillwater Canyon but in Labyrinth Canyon would strike a sand bar every hour or so. On one or two occasions, as I recall, we were compelled to walk as much as a quarter of a mile to reach deeper water. The sand bars didn't hurt our boats and we did not consider them of any particular importance except that they retarded progress. I do not wish to intimate that we spent most of our time on sand bars in Labyrinth Canyon or anything of that kind. (R. 1577-9, Vol. 9.) In Glen Canyon the water was at low stage. It is true, as stated in my book, that a trifle more water would have done away with the sand bars, or at least would have enabled us to ignore them completely. I think it would have required considerably more water to have done away with them in Labyrinth Canyon so that we wouldn't have been bothered by them. (R. 1580, Vol. 9) I remember no sand bars in the Colorado River after we reached a point 20 miles below the Dirty Devil. The only thing we observed on the stretch of river between Cataract Canyon and the Utah-Arizona state line which created anything approaching the obstacles encountered by us in Labyrinth Canyon was the one rapid I have referred to located just below the mouth of the San Juan, the sandstone ledges I have spoken of and some sand bars. In going over those ledges I do not recall spending any time trying to pick out a particular channel for our boat. (R. 1581, Vol. 9.) In my book entitled "Romance of the Colorado" (Exhibit 13, at page 287), I say that all through Glen Canyon we found evidences of Pueblo-an occupation and that the "river was tame." It would have been better had I said that the river was "comparatively tame." Below the San Juan we had

no trouble except at the rapid, "the only real rapid in the Glen Canyon." We made no portage there, ran right through it, and did not consider that there was any danger incident to doing so and paid no attention to it. Below that rapid I recall no obstructions or navigation difficulties from sand bars, shoals or any other cause. (R. 1582-6, Vol. 9.) The only place below Green River, Utah, where our boats were filled with water was in Cataract Canyon and the only other place where you might ship water would be at the rapid in Glen Canyon that I have mentioned, but I don't think we shipped any water there. (R. 1589, Vol. 9.) I don't recall seeing any sand waves but we would not mind sand waves. I suppose we had 1000 or 1200 pounds of supplies in each of our boats after we left Green River, Utah. (R. 1590, Vol. 9.) We left one of our boats at the Dirty Devil and loaded all of our supplies in the remaining two boats, so that from there down to Lees Ferry our boats were more heavily loaded than they were at Green River, Utah. (R. 1591, Vol. 9.) In Glen Canyon there are bottom lands, all the way through which have been cultivated by the Indians, some of them perhaps a quarter of a mile long and several hundred yards wide. (R. 1593, Vol. 9.)

John Wetherill testified: I have seen Turner's 24-foot motor boat on the Colorado. He also used a sail on that boat and he had placer mines there in 1915. (R. 1611, Vol. 9.) He was there for several years and I have seen him going down the river in his boat but haven't seen him use the sail. (R. 1612, Vol. 9.) When Turner took me across the Colorado River all of the stock swam the river. (R. 1645-6, Vol. 9.) Between Hite and Lees Ferry there were the following recognized Colorado River crossings: Hite; Red Canyon; Halls Crossing; Hole-in-the-Rock; Crossing of the Fathers. There is a trail or road by which one can get to those crossings and all of them have been established for some years. (R. 1648-50, Vol. 9.)

Owen R. Clark testified: I have lived at Lees Ferry since August, 1922, and am Recorder for the U. S. G. S. On November 10, 1927, I left Green River, Utah, with a party in charge of Mr. LaRue. (R. 1707, Vol. 9.) The purpose of the trip was to take moving pictures. We had six boats 18 feet long, 5-foot beam, and two 16-foot boats. (R. 1708, Vol. 9.) Between Green River, Utah, and the mouth of the San Rafael we had no severe trouble except that two of the boats grounded, and I think they were 15 or 20 minutes getting loose. Between the mouth of the San Rafael and the mouth of the Green the only trouble we had was on sand bars and getting out of the channel. (R. 1710-11, Vol. 9.) My boat was stuck once and I can't be positive how many times the other boats were stuck between the mouth of the San Rafael and the mouth of the Green. (R. 1712, Vol. 9.) In going through Cataract Canyon two boats were slightly damaged. We portaged our cargo around the Dark Canyon Rapid and lined our boats part way through, shooting the remainder of the rapid. We lost no boats. We ran all of the rapids except one. (R. 1714-15, Vol. 9.) From the foot of Cataract Canyon to Lees Ferry our difficulties consisted of running on gravel bars. One or two of the boats were hung up so that a man had to get out to push them off. We also had some difficulty with what they call whirlpools. We encountered no rapids in Glen Canyon. (R. 1717-18, Vol. 9.) Moving pictures were taken all the way down on our trip, which consumed 21 days. (R. 1719-20, Vol. 9.) On five or six occasions I have made an upstream trip from Lees Ferry. The first trip was in July, 1926, in a 26-foot motor boat with a 5-foot beam and drawing 18 inches of water. We went up approximately 40 or 50 miles, the flow of the river at that time being about 40,000 second feet. We had difficulties with sand bars and in making headway against the current. Two and a half days were consumed going up. (R. 1721-4, Vol. 9.) In taking advantage of the eddies going upstream you

may get into a pocket with no outlet and be compelled to return downstream and choose another course. (R. 1725, Vol. 9.) I found that when the river was high we didn't have enough power to go upstream, and when it was low there was too much trouble with sand bars. (R. 1731-2, Vol. 10.) At Lees Ferry bars often form in an hour's time and then cut out. Many times the bars will hold the ferry boat 50 feet from the bank and we would be delayed from a half to three-quarters of an hour getting across. (R. 1732-3, Vol. 10.) I ran this ferry boat for the County between May, 1923, and February, 1925. We ordinarily made four or five trips a day, and in the fall I have made as high as sixty or seventy trips a day with the ferry boat. (R. 1734-5, Vol. 10.) On my upstream trip from Lees Ferry in July, 1926, I found trouble with swift water at two places and also sand bar trouble. (R. 1734-5, Vol. 10.) On my upstream trip from Lees Ferry in July, 1926, I found trouble with swift water at two places and also sand bar trouble. (R. 1738, Vol. 10.) When we turned around to come back we had about two gallons of gasoline left, which we used up on our downstream trip. (R. 1741-2, Vol. 10.) Most of our sand bar trouble in operating the ferry occurred in low water periods. (R. 1747, Vol. 10.) When I made my upstream trip with the Ford motor boat we traveled 16 miles the first day, 24 or 25 miles the second day, and after we had traveled 8 or 10 miles the third day we stopped our journey. (R. 1755-6, Vol. 10.) The trip with the LaRue party from Green River, Utah, was a commercial undertaking for the purpopose of obtaining moving pictures for commercial purposes. (R. 1758, Vol. 10.)

Julius F. Stone testified: In 1898 I went to Glen Canyon, having invested some money in Mr. Stanton's placer mining venture there. I remained six weeks or two months, during which time about twenty men were employed by Mr. Stanton. There were other prospectors farther down the river. We had boats that

we used for crossing the river and taking supplies, occasionally taking trips down the river with supplies to other camps which were established from place to place. Mr. Stanton had practically the whole of Glen Canyon surveyed and located for placer claims. Some of his employes brought a boat up from Lees Ferry by means of rowing and towing. The stage of water was fairly uniform while I was there and we had no great flood but bars would shift to greater or less extent with every change in the volume of current. (R. 1760-8, Vol. 10.) In going from Trachyte Creek down to Lees Ferry we grounded several times. There were not what you would call rapids in that stretch, although at Aztec Creek there is some unquiet water. (R. 1769, Vol. 10.) The Stanton boat that came up from Lees Ferry was 18 or 20 feet long, rather heavily constructed, and propelled by oars. (R. 1772, Vol. 10.)

On my next visit to the river we began our journey at Green River, Wyoming, and went down stream to Needles, California, using four 16-foot keel boats, with a 4-foot beam and a depth of about 8 inches and a draft of 5 or 6 inches. There were two men in one boat and one man in each of the other boats. (R. 1773-4, Vol. 10.) We left Green River, Utah, on October 11, taking on new supplies in our boats at that point. The boats were practically open. Between Green River, Utah, and the mouth of the San Rafael there were just a few riffles. I recall no groundings on sand bars and we had no serious difficulty. (R. 1781-2, Vol. 10.) In that stretch we were probably hung up on two or three times but that was all in the day's work. In Labyrinth Canyon we had quite a little trouble with sand bars, at times getting out of the boat and at other times rocking it loose. From the end of Labryinth Canyon to Cataract Canyon we possibly grounded once or twice. (R. 1783, Vol. 10.) Through Cataract Canyon we lost no boats, portaging our cargoes at some of the rapids and at places lining the boats; at other places running the rapids without

either portaging or lining. (R. 1786-7, Vol. 10.) We ran all of the water in Narrow Canyon and encountered no difficulties between the end of that canyon and Lees Ferry except grounding on sand bars. (R. 1788, Vol. 10.) I don't think I could have taken my boat from Lees Ferry back up to Hite alone, although possibly I could have done so. I possibly could have taken my boat from the mouth of the Green River up to Green River, Utah, but could not have rowed all the way; it would depend a good deal on the stage of water. (R. 1792-3, Vol. 10.) On my 1909 trip with Mr. Galloway he was the only member of the party who was familiar with the river. (R. 1797-8, Vol. 10.)

Constantine Rodin testified: I left Green River, Utah, on November 10, 1927, with a party in charge of Mr. LaRue, the witness, Owen R. Clark being in the party. Between Green River, Utah, and Cataract Canyon some of the boats grounded quite a few times the first few days and later at times. I can't tell how many times we encountered bars in Labyrinth Canyon, but if you are not watching the swift current will take you on to the bars, where naturally the boat will get stuck and you will have to get out and push it off to deeper water. We had quite a little difficulty in Cataract Canyon. (R. 1800-4, Vol. 10.)

In the section below Cataract Canyon we sometimes had to get out and push a boat off a bar, but that did not occur every day. At times some of the boats stuck and some did not. We did not take on any supplies between Green River, Utah, and Lees Ferry. (R. 1808, Vol. 10.) Our great trouble between Cataract Canyon and Lees Ferry was to keep warm enough. (R. 1809, Vol. 10.)

Valentine Woodbury testified: I was on the trip in Mr. LaRue's party with the witnesses Clark and Rodin. My boat was loaded so that it had a draft of 9 or 10 inches. (R. 1812-14, Vol. 10.) At places on

the Green our boats had trouble with sand bars and we would touch bottom with our oars. I recall getting stuck at Double Bowknot and at a point 14 miles below Green River, Utah; I think there were other times beside these two, but they are the only two instances that I recall. We encountered no difficulty between the mouth of the Green and Cataract Canyon. Mr. Rodin's description of our trip through Cataract Canyon is about the same as mine would be. (R. 1816-19, Vol. 10.)

The boiling condition that we encountered below Cataract Canyon is just the ordinary swirling of water that occurs in any stream where there are rocks in the current. Perhaps on our trip there were fifteen or twenty occasions when most of the boats were stuck, but it was not always necessary to get out of the boat to push off. I think we were all stuck just below Double Bowknot on the Green except Mr. Dodge. I am not sure whether we were all stuck at the place above Bullfrog Rapid but am sure all of our boats dragged there. We did not all get out. On the one occasion in Glen Canyon and once at the Bowknot the majority of our boats were stuck. (R. 1823-8, vol. 10.)

Outside of Cataract Canyon there was no unusual difficulty in taking our boats through any section of the rivers we traversed except at the bad swirls in the narrow parts of the canyon. (R. 1830, Vol. 10.)

T. G. Gerdine testified: I have had 36 years' experience in the U. S. G. S. and am Division Engineer of the Topographic Branch and supervised the survey work on the Colorado River. The 1921 surveys for dam sites in Glen Canyon were made in cooperation with Southern California Edison Electric Company. (R. 1846-8, Vol. 10.) In July, 1921, I went from Lees Ferry to Warm Creek in a flat bottom scow propelled by a marine engine, which had been designed to carry supplies up to the rapids below the mouth of the San Juan River; the boat was 27 feet long with a

7-foot beam, and its draft would depend upon its load. We put it in the river below the Paria Rapids, 3 miles below Lees Ferry, but it wouldn't go up those rapids without help. (R. 1849-52, Vol. 10.) We assisted it over the rapids and it was easy going to Lees Ferry. Upstream from Lees Ferry we encountered rapids and a sand bar that night about 11 miles above Lees Ferry. Next morning we found it easier to follow a course up the south bank of the river and went on to Warm Creek. (R. 1854, Vol. 10.) Next day we went back to Lees Ferry because it was too much of a struggle to go further up the stream, which was flowing from 25,000 to 28,000 second feet at that time. Later I made another short trip up from Lees Ferry and encountered no difficulty. (R. 1855, Vol. 10.) I believe the boat in which we took my trip up to Warm Creek had a draft of 18 inches loaded. There was no rapid or riffle at Warm Creek, where we turned around and came back, it being pretty good water there and not difficult as compared with water we had been over. (R. 1882-5, Vol. 10.)

William Hiram Edwards testified: I was with the Stanton expedition of which Mr. Nims was a member and which launched its boats at Crescent Creek on December 6 or 7, 1889. (R. 1893-7, Vol. 10.) Between Crescent Creek and Tickaboo Bar we were stuck on bars quite a good deal. Between Tickaboo Bar and Lees Ferry we had no difficulty in operating our boats except as a result of the extreme shallow water. I think we made one portage of about a half a mile because of shallow water, but can't locate the place. (R. 1898-9, Vol. 10.) Between Crescent Creek and Lees Ferry we saw, in addition to a party from Omaha, eight or ten other people engaged in placer mining. On Tickaboo Bar they had a 40-horsepower pump. (R. 1901, Vol. 10.)

The next time I saw Glen Canyon was in 1891, when I was with a party of eight in charge of J. D. Best, Harry McDonald being head boatman and El-

mer Kane and L. H. Jewell being also boatmen. (R. 1902-3, Vol. 10.) We left Green River, Utah, in July, 1891, with two boats like those used on the Stanton expedition. They were 22 feet long with a 4½ foot beam and a depth of 32 inches. We encountered no difficulties between Green River, Utah, and the mouth of the San Rafael except that we grounded at Devil's Auger and shipped water. (R. 1904-5, Vol. 10.) In going through Labyrinth and Stillwater Canyons our boats didn't ground as frequently as on my later trip but there were plenty of sand bars. From the mouth of the Green to Cataract Canyon we encountered no difficulty. (R. 1906-7, Vol. 10.) We lost a boat in running Rapid No. 13 in Cataract Canyon. (R. 1908, Vol. 10.) At Hite we picked up a flat bottom boat and repaired it and continued on with that and our other boat to Lees Ferry. (R. 1912, Vol. 10.) I don't recall encountering any sand bars between Narrow Canyon and Hite. On the way down we staked off several claims and had more or less trouble with bars. (R. 1913-14, Vol. 10.) I can't say whether I noticed any difference in the channel of the river through Glen Canyon between my first and second trips. (R. 1915, Vol. 10.) In 1893 I and some others leased a steam launch that had been abandoned at Wheeler's ranch and we intended to investigate the possibility of navigating the river with tourists. This boat had been abandoned in 1891 and was known as the Major Powell; it was about 35 feet long, had a beam of 8 feet and a draft of about 18 inches. We repaired the Major Powell and started down stream, three of us on board. It had been changed from an oil burner so that it would burn wood. We would travel until we ran out of wood and then stop and gather more for fuel. We had plenty of difficulty with sand bars and stopped about a quarter of a mile above the first cataract in Cataract Canyon. Coming back upstream, we had less difficulty because we could back off from sand bars, but we required more wood. The water had risen between our downstream and up-

stream trips. We took the Major Powell back up to Wheeler's ranch. (R. 1916-22, Vol. 10.) We took a later trip at a higher stage of water and the bars had shifted so that information as to channel gained on our first trip was not of much use. On our return journey on the second trip we had considerable trouble at the mouth of the Green in getting the Major Powel out of the Colorado and into the Green. We again tied the boat up at Wheeler's ranch. (R. 1922-4, Vol. 10.) In 1894 I was with a mining company at a camp 7 or 8 miles below Green River, Utah, when three or four fellows brought the Major Powell up to our camp and there abandoned it. I judge that Wheeler's ranch was about 15 miles below that camp. They took the engine and boilers off the boat and used them in operating a wrecking plant at Green River. (R. 1924-5, Vol. 10.)

In 1892 I went to Red Canyon on the Colorado and thence 15 or 20 miles down the river to some placer mines in an old boat that I found at Red Canyon. (R. 1927, Vol. 10.)

In 1895 I was again on the Green River 8 miles below Green River, Utah, where I put in an amalgamator; there were some bars and a dry land dredge there. Messrs. Galloway, Flavell and Richards passed along down the river with their boats bound for the canyon. We employed about twenty men at the dredge. Finally we sold the dredge. We had two 100-horsepower boilers, a steam engine and an electric generator and used coal for fuel. (R. 1934-5, Vol. 10.)

In 1892 I went to Dandy Crossing but can't remember whether our horses had to swim part of the distance or not when we took them across. (R. 1940-1, Vol. 10.) The row boat in which I made the trip down the river at that time had oars and coming back upstream with the boat we probably rowed and towed as is usually done on any river. (R. 1941-2, Vol. 10.) On the Stanton expedition I acted as first boatment and then as cook. Mr. Nims who was on

that expedition seemed to be a keen observer of facts. (R. 1944-5, Vol. 10.) I never observed any sand waves during any of my trips on the Green or Colorado Rivers. In our mining operations I never heard of any government permits and know nothing about any government permits for our placer mine. (R. 1958, Vol. 11.) Exhibit 233 is a picture of Aztec Fort located below Bowknot Bend on the Green River. We there found where the Cliff Dwellers had irrigated probably 200 acres on the river bottom and found a ditch some 60 feet above the river; we could trace out their ditches and laterals. There was no sign of any trail indicating how they got in or out of there. (R. 1962-3, Vol. 11.)

The Major Powell was 35 feet long with two 6-horsepower engines, and in my opinion that is not sufficient horsepower to utilize on the Green River. If we had had more horsepower we could have come up the river better. The current of the river was our principal trouble and more horsepower would have overcome that. (R. 1978, Vol. 11.)

Elmer Kane testified: In the summer of 1888 I made a raft trip from Grand Junction to Moab. (R. 1984, Vol. 11.) We could not get a boat at Moab with which to continue our journey on down the river as we had intended so went from there to Salt Lake. Placer miners whom we saw on the river above Moab had a flat bottom skiff which they had used when they came down from Grand Junction. We also saw small boats used by people who lived on the river to cross back and forth. (R. 1985-7, Vol. 11.)

In 1889 I left Crescent Creek in December with the Stanton party. We used two pairs of 9 or 10 foot oars in each boat; the boats were overloaded. No rough water bothered us but with the cargo and passengers the boats would sink down level with the water and were hard to handle. (R. 1992, Vol. 11.) We got stuck on sand bars. "There were certain channels that would let a boat through, if you fol-

lowed them and could follow them." We would decide on a place to run through and probably would get through all right, but at times would have to drag the boats or push them; then for a few miles we would have smooth water of sufficient depth. We would find these conditions every few miles through Glen Canyon and also in the stretches above Cataract Canyon. (R. 1993-4, Vol. 11.) Between Hite and Lees Ferry we encountered quite a number of rapids or rough water, including Tickaboo and Trachyte Rapids. All of these rapids are at the mouth of side washes. The river would change at each different stage of water. (R. 1995-6, Vol. 11.) We had 1600 or 1700 pounds of supplies in the boat, it may have been a ton, when we left Crescent Wash. In addition to this weight we had the passengers. (R. 2000, Vol. 11.)

On July 3 or 4, 1891, we left Green River, Wyoming, with the Best expedition. The testimony of the witness Edwards concerning the boats used on that expedition reflects my recollection. (R. 2001, Vol. 11.) We arrived at Lees Ferry on August 26. The only trouble we had on our journey down to the mouth of the Green River was shallow water; at places there were several channels; we generally didn't pick a channel until we got stuck on the bar and then would look for deeper water. I don't think any member of our party had ever before been on that section of the Green River. The riffles between Green River, Utah, and the San Rafael gave us no difficulty. We touched bottom on one of them but did not stop. At another place one of our boats touched bottom. Between the mouth of the San Rafael and the mouth of the Green both boats ran on to sand bars a number of times each day. There was no trouble encountered between the mouth of the Green and Cataract Canyon. (R. 2003-5, Vol. 11.) The boat in which McDonald, Best, Jewell and I were riding struck a rock at Rapid No. 13 in Cataract Canyon and was lost. (R. 2006-7, Vol. 11.) All the other

boats ran all of the rapids in Cataract Canyon. (R. 2013, Vol. 11.)

From Cataract Canyon to Lees Ferry we had fairly good water, but I remember two rapids at Dark Canyon and another one somewhere below. (R. 2013, Vol. 11.) The sand bars in Glen Canyon were not so bad as they had been in the previous December but we had to make one portage of our cargo and shove the boats through light for about a mile. That was where we encountered the reefs. (R. 2016, Vol. 11.) The boats used by us in 1889 had a draft of about 14 inches loaded and on the 1891 Best expedition our boats were of substantially the same type. (R. 2026, Vol. 11.) The raft we used on our trip from Cisco to Moab was about 14 by 5 feet and built of dry pine logs; we found it lying on the bank. (R. 2033-4, Vol. 11.) Mr. Nims was on the Stanton trip when we went over the reefs and made the portage mentioned by me. He was on both Stanton trips. I don't remember whether we made a portage each time we went over those reefs. (R. 2034-5, Vol. 11.)

Kenneth Sawyer testified: For a number of years I was with the U. S. Reclamation Service and in 1914 with the government party in charge of John F. Richardson and engaged in making a survey for reservoir and dam sites on the Green and Colorado Rivers. (R. 2093-5, Vol. 11.) Machinery consisting of boiler, engine, casings, tools, drill rods, etc., was loaded on to boats at Wimmer's ranch on the Green River and taken thence down the river to the dam site at the junction of the Green and Colorado. There were two scows approximately 6 by 24 feet each, which were decked over and fastened side by side, making practically one boat. (R. 2094-6, Vol. 11.) We had three row boats, two small motor boats, and Mr. Wimmer's boat the Marguerite. The trip downstream took three or four days. We grounded on sand bars many times, the channel being a little difficult to pick out. (R. 2097-9, Vol. 11.) Exhibit 264 is a picture

of our light barge and shows our survey barge, the Betsy Ann, stuck on a bar. (R. 2100, Vol. 11.) During our drilling operations at the junction I was compelled to go out at times. (R. 2102, Vol. 11.) One morning there was a sudden 8-foot rise in the Colorado River and immense quantities of driftwood came down, which collected on the ropes anchoring the barge on which our drilling outfit was placed. We were compelled to cut the front anchor lines in order to save the barge and machinery. Thereafter we took the outfit out. (R. 2104-9, Vol. 11.) We made the Betsy Ann into a steamboat, installing a paddle wheel on it, loaded 600 pounds of coal that Wimmer had brought down in the Marguerite, and took the Betsy Ann upstream on its own power. Going upstream the Marguerite pushed one of our small scows and the two motor boats pushed the other scow, we having loaded all we could of our outfit on the scows. We had some difficulty getting around sharp bends of the river and grounded on sand bars but arrived at Wimmer's ranch without any serious accident, there unloading the equipment, which was taken by wagon to Green River, Utah, and shipped on the railroad. (R. 2110-14, Vol. 11.)

When we made our survey Captain Yokey had charge of the boats. During that period we had motor boats 14 or 16 feet long, 4 or 5 feet wide, and with a draft of 7 or 8 inches. With those boats we encountered trouble with sand bars but became accustomed to them like eating and sleeping. (R. 2117, Vol. 11.)

While our drilling operations were in progress I made three or four boat trips out, two up the Colorado River and on one occasion I went with Mr. LaRue on Wimmer's boat up the Green River. We could discover no fixed channel in the Green except in two or three places where the water was very fast and deeper. Although there were no marked changes in the river while we were there except that one flood down the Colorado, there was a shifting and chang-

ing of bars. The five days consumed by us in going upstream with our drill outfit doesn't represent actual running time. Our upstream journey after we finished our survey also consumed four or five days. (R. 2118-21, Vol. 11.)

Mr. Wimmer had been awarded the contract for freighting our equipment and supplies to the junction. On the downstream trip with our equipment the width of the two scows that were fastened together was 17 or 18 feet and the length 24 feet. Wimmer's boat, the Marguerite, was tied behind the scows and shoved them. The drilling machinery weighed about $2\frac{1}{2}$ tons and our entire load on the two scows was possibly four tons. (R. 2123-4, Vol. 11.) One of our motor boats pushed the Betsy Ann downstream. We had provisions, supplies, etc., loaded on that boat to the amount of $2\frac{1}{2}$ or 3 tons. The row boats were moored alongside of the Marguerite and the two scows. (R. 2124-6, Vol. 11.) We used coal for fuel in our drilling operations and on the down trip we took coal with us and Mr. Wimmer would bring us more coal on his subsequent trips while drilling operations were in progress. I imagine he made four or five round trips furnishing us with coal and supplies; about one trip every two weeks was his schedule. (R. 2129, Vol. 11.) He would bring about 1000 pounds of coal at a trip on the Marguerite. (R. 2130, Vol. 11.) When we took the outfit upstream the Betsy Ann carried 600 or 800 pounds of coal besides our machinery, weighing about 2500 pounds and three passengers. It also towed our row boats. The actual running time of the 95-mile trip up stream when we took out our drill outfit was $36\frac{1}{2}$ hours. There were ten or twelve men, including Mr. Wimmer, with us. (R. 2137-9, Vol. 11.) Our cook was a woman who went down the river and came back up with us. (R. 2141, Vol. 11.) When we went down on our survey with Captain Yokey we took sufficient supplies with us to last the entire month that we were gone. (R. 2142-4, Vol. 11.) Before making the motor boat trips

from the junction up to Moab, when I had occasion to go out during the progress of drilling operations, neither I nor Mr. Shaw who operated the motor boat had ever before had any familiarity with that stretch of river. On the first trip I walked six miles up to Moab, but on my subsequent trips I traveled the entire distance in the boat. (R. 2144-5, Vol. 11.)

Harry McDonald testified: I am 77 years old. (R. 2150, Vol. 12.) About 1888 my partner and I went to North Wash on the Colorado River and with five other men I remained there mining and prospecting for gold. I built a flat skiff for use on the river in crossing and with which to reach the bars. (R. 2165-8, Vol. 12.) Hite then had an outfit two or three miles below us. (R. 2170, Vol. 12.) Later I joined the Stanton party at Green River, Utah, then known as Blake. There were sixteen men in the party and I had charge of the boats. From Green River, Utah, down to the junction we ran along feeling out the channel, which is arbitrary through there; every once in a while we grounded; sometimes four or five times a day, and at other times not so often. Down to the mouth of the San Rafael it was pretty bad in places. (R. 2171-3; Vol. 12.) Going through Cataract Canyon we lined our boats, which were too heavily loaded, and there lost three boats. (R. 2176, Vol. 12.) We got more supplies just below North Wash and between there and the San Juan had trouble several times in running on to bars and rocks. There is one place where there is a shelf or ledge of rock and you have to find an opening through it. We felt our way across until we came to an opening in the ledge and then put our boats through. (R. 2178-9, Vol. 12.)

(This shelf or ledge of rock referred to by this and many other witnesses was, in response to a question propounded by the Special Master, fixed by Mr. Ryan at a point about Mile 112 above Lees Ferry.)

There are quite a few rapids in Glen Canyon but most of them are not bad to run. (R. 2181, Vol. 12.)

From the San Juan down to Lees Ferry, we had no trouble. At three places we got on bars. (R. 2183, Vol. 12.) I later made a second trip, going on the second Stanton expedition. We came to the place where the ledge crosses the river before we noticed it but found a channel through which we got our boats. We had more trouble with bars on this trip. (R. 2191-3, Vol. 12.)

In 1891, I accompanied the Best expedition, using the same kind of boats we had on the Stanton trip. We didn't find the channel in the same place on the Green River as on my former trip and had the same trouble with bars and hunting channels. This trouble occurred sometimes two or three times a day. We lost one boat in Cataract Canyon and had lots of trouble with sand bars in Glen Canyon, but the channel there was not as bad or as changeable as on the Green River. (R. 2194-6, Vol. 12.) We again had to hunt around for a channel through the ledge, which is between 75 and 100 yards wide. (R. 2197-8, Vol. 12.) After leaving the Best expedition at Lees Ferry, I returned to Glen Canyon five months later to work for myself. The Stanton dredge was constructed in 1899 or 1900, the lumber coming overland to the river. It was an 82 bucket dredge and could dig in 28 feet of water. (R. 2201, Vol. 12.) The hull, buckets, pumps, 5 engines, 82 tables for saving gold, the amalgamator, settling tank and plates all came to the river overland. We also had an ice plant on shore for the purpose of keeping supplies from spoiling. We put in a telephone line between the two bars we were working and built a scow that we could take down and load with material and pull back up. (R. 2202-4, Vol. 12.) We had no difficulty with sand bars in taking this scow upstream. The heavier pieces of machinery were brought to the river with eight and ten span of horses. Fourteen or fifteen carpenters were employed in building the hull of the dredge, which was operated by about eight men. The dredging operations continued for eight or nine months,

when the concern went into the hands of a receiver. (R. 2204-7, Vol. 12.) There was an old fellow named Meskin in there prospecting and mining; he would be months and months away from Lees Ferry and would go up as far as Hite. (R. 2214-15, Vol. 12.) In our dredging operations we took out gold that was shipped to New York. (R. 2221, Vol. 12.) Before I went on the Best expedition I took a trip with Old Rocky, trapping and hunting on the river between Green River bridge and a point below Wheeler's ranch. (R. 2223, Vol. 12.) We encountered about the same amount of trouble navigating the Green on the trips concerning which I have testified that we met with in navigating the Colorado River between Cataract Canyon and Lees Ferry and I would say from my observation that the impediments and obstacles to travel up and down in boats are about the same on those two stretches of river. (R. 2226, Vol. 12.)

Robert N. Allen testified: In 1921, I was with the U. S. G. S. on the San Juan River with the Trimble party. We put our boats in the river about 3 miles below Bluff on July 18, 1921. (R. 2233-5, Vol. 12.) After reaching the mouth of the San Juan River we did not have nearly as many difficulties in operating our boats on the Colorado but there were several rapids similar to those on the San Juan. (R. 2244, Vol. 12.) On our trip to Lees Ferry we grounded four or five times but weren't compelled to get out and push our boats. (R. 2245-6, Vol. 12.)

David E. Rust testified: In 1897, my brother and I got a boat at Hite which he took down the river to Last Chance Creek, where I had taken some horses. We spent three months placer mining there and saw Mr. Stanton take his boats down the river and also saw another party of prospectors going down stream in a small boat. I then saw Nathan Galloway coming up the river, rowing and towing his boat. Last

Chance Creek is not far above the Crossing of the Fathers and I went from there upstream about 60 miles in my boat to Halls Crossing, where there were two or three other small boats. (R. 2258-61, Vol. 12.)

In 1898, I worked on the Good Hope Bar for three months. About twenty men were then employed there. Supplies were brought overland to Hite and thence to Good Hope Bar in boats, which were 20 feet long and designed to carry about a ton. They would be rowed and towed up stream. During that stay on the river I saw Mr. Stanton with a crew of about ten men doing assessment work. They used boats in going up and down the river. There were several small boats then at Hite. Our boats had a draft of about 1 foot loaded. The river was at medium stage then and we did not encounter much difficulty between Good Hope and Hite, where I did my boating. (R. 2262-5, Vol. 12.) I find that the stage of water makes a great deal of difference; I have seen a channel change within a week. I always preferred a low water stage but I have been on the river in every month of the year except June. (R. 2266-7, Vol. 12.)

During the past twelve years I have made on an average of one trip a year through Glen Canyon, conducting travelers who wished an unusual trip. These trips have been made from North Wash to Lees Ferry. I have used a small canvas folding boat of the 14 and 16 foot type, with a 5-foot beam and a draft of 6 inches loaded. They are pointed at each end, are operated by oars and carry two passengers and luggage. One of the passengers acts as boatman. (R. 2268-70, Vol. 12.) I have encountered sand waves on this streach of river and endeavor to keep the boats out of them. There is usually quiet water on one or the other side of the river and we are able to keep out of the sand waves. I prefer to go through sand waves with my boat lengthwise in the trough of the wave, but have done it both ways and have always gone through safely. (R. 2272, Vol. 12.)

There are some small rapids between Crescent Creek and Lees Ferry, including Trachyte, Tickaboo, Bullfrog and Rainbow Rapids. We never encounter any real difficulty on account of sand bars with these small boats, but occasionally will touch a bar. I have not found it necessary to get out of the boat in order to get off a sand bar. (R. 2273-4, Vol. 12.) I do not engage in general advertising of my tourists' trips. I have taken them in April, September, July, August and October. On one trip I lost a boat when two members of our party became careless just before we reached Lees Ferry and ran into sand waves and capsized. (R. 2275-6, Vol. 12.)

I try to accommodate the date of my trips to the convenience of the tourist. On the occasion I have mentioned when a boat capsized the men who were operating it did not follow my boat as they were supposed to do. In all my experience on the river, I have never had an upset and in all that experience no other member of my party has had an upset except on that one occasion. Governor Dern of Utah was a member of that party. I have taken ladies through Glen Canyon on these trips. My daughter was with me on two separate trips where the wives of men going with me were in the party. My daughter does not swim. Members of the parties I take through Glen Canyon on these trips do not wear life preservers. (R. 2281-3, Vol. 12.) We usually figure on about five days actual running time for the trip from Crescent Creek to Lees Ferry, with three or four days off for side trips. I know of the place on the Colorado River where there is a reef or strata of rock running across the stream; it is 10 or 15 miles below Halls Crossing. There is a little narrow channel to the right of the island which we go down without difficulty; that channel is possibly 40 or 50 feet wide and there is no place where it is less than a foot deep. There are parts of the channel where the water would be 2 or 3 feet deep at any stage of water I have ever seen. (R. 2284-6, Vol. 12.)

Dean Daily testified: I live in Hollywood, am 25 years old, have had experience in boating on the Columbia, Snake, Colorado and Green Rivers and was with the Pathe Bray expedition in 1927, on the Colorado River. Between Green River, Utah, and the mouth of the San Rafael we continually grounded on sand bars, especially on mud flats around the San Rafael. Between the San Rafael and the mouth of the Green there weren't so many sand bars but the water was shallow and we hit a good many riffles where the boats grounded several times. In going through Cataract Canyon we had a good deal of difficulty; "the water was very shallow; we were continually grounding, all the time." When you ask me about Cataract Canyon, do you mean the place where "the first series of small riffles begins?" I know where the junction of the Green and Colorado is located and "the first part below the junction is very shallow water; we hit on sand bars; and below that the sand seems to give way to small pebbles, that is, the stream is low, and you grate along on sort of riffles in the stream; it is not sand, but the surface is very close to the water, and we grated along there." I never wore a life preserver but all the rest of the party wore them. (R. 2297-2305, Vol. 12.)

Bert Loper testified: After leaving the San Juan in 1895 I went to Moab until October, 1895, and there were then boats on the Colorado River, the largest except the ferry boat being a 16-foot row boat. One day they ferried 3000 sheep across and the boat was used for ferrying teams and stock. I saw no boats bring in or take out merchandise from Moab. (R. 2320-2, Vol. 12.)

After the Trimble party came down the San Juan River to the Colorado River in 1921, I took our cook and recorder down to Lees Ferry, went overland from there to Flagstaff, and brought back another cook and a rod man. The water was very low at that time and running on to a few sand bars constituted about

all of our trouble. I went downstream in our boat but came back up in a 25-foot motor boat, with a draft of about 18 inches loaded. There were six or seven people on the boat and I also had my row boat. Our most serious difficulty coming upstream was in finding a channel at Last Chance Creek, but we finally got the boat over the sand bar at that point. Later I went down the Colorado River to Lees Ferry and that was my last trip until this month. (R. 2340-4, Vol. 13.)

On September 19, 1907, I left Green River, Utah, on a prospecting trip down the river with Charles Russell and Ed Monette. We had three steel boats, 16 feet long, 18 inches deep, and a 4-foot beam, without motors. Down to the mouth of the San Rafael, the only trouble we encountered was striking one riffle and I believe gravel. Through Labyrinth and Stillwater Canyons we had trouble at nearly every channel crossing where one or all of us would run aground. I couldn't tell by observation where the deepest water was and we daily encountered difficulties with channel crossings—sometimes several times a day. (R. 2347-50, Vol. 13.) We only portaged one rapid in Cataract Canyon. (R. 2351, Vol. 13.) From Narrow Canyon to Hite we encountered the old conditions; at North Wash there is only one channel through, which has never changed since I knew the river. I was in the canyon from 1907 to 1915. Monette, Russell and I did some placer mining at the old Stanton dredge for about a month, taking out a little gold. They went on to Lees Ferry, where I later followed expecting to meet them, and when I found they had gone on I turned around and pulled my boat back up the river to Hite in November. I was five days on the downstream trip to Lees Ferry, grounding numerous times, especially at Shoek Rapid. I recall crossing the ledge just below the mouth of Lake Canyon, but I never had very much trouble getting over that ledge. At Lees Ferry I got enough supplies to take me back up to Hite. (R. 2353-7, Vol. 13.) On my upstream

trip I saw some people placer mining where Russell, Monette and I had mined. My supplies would come overland to the river at Hite and I would drag them up the river in my boat to Red Canyon, where I located. (R. 2359-60, Vol. 13.) I lived at my ranch for seven years and during that period traveled from Green River, Utah, to Lees Ferry; made numerous trips to the dredge, other trips to Olympia Bar and to the California Bar. I observed changes in the channel at all stages except high water, when it is always on the outside of the river. High water always leaves sand bars on the inside of the bends. The high water cleans the river, and after that the summer floods come along and fill the channel again. (R. 2364-5, Vol. 13.) Even at points where the river crosses there are some deeper places which we try to find, which I suppose you would call the deeper part of the channel. What I intend to testify to is that from year to year, you can't tell in advance where that deeper place is, and I am probably wrong in saying that there is no chanel there. (R. 2366-7, Vol. 13.) At crossings there are places that are 2 feet deep, but you have to get out and wade around to find them, and in approaching a crossing you know that you are going to encounter those very things; in other words, you have to hunt for the channel where the river crosses when the water is at a lower stage or when there are rains in the mountains. (R. 2368, Vol. 13.) In 1911, I went with Mr. Seaboldt, who was investigating placer mining, from Hite to Lees Ferry; we encountered only the usual sand bars, ran on a rock at Trachyte and Shock Rapids, hitting a gravel reef at Shock Rapid, with no serious result. This trip was made in December, 1911, and we towed our boat back upstream, leaving Lees Ferry, January 31, and arriving at Hite February 17 or 18. (R. 2370-2, Vol. 13.) In July, 1914, I again left Green River, Utah, with Charles Russell, with two steel boats that we tried to deck over but couldn't make water tight. The boats had keels. We had no trouble down to the

mouth of the San Rafael and very little trouble in Labyrinth and no trouble in Stillwater Canyon. In Cataract Canyon, at Rapid No. 4, the waves were 20 feet high and right below where we expected trouble there was not any rapid. Because of Russell's peculiar actions and his fear of the big waves, he had an upset and lost his boat. (R. 2374-84, Vol. 13.)

In September, 1914, I was employed with the Richardson party, then engaged in drilling at the junction of the Green and Colorado. I made one trip in the Marguerite from Wimmer's ranch to the junction, and on the way down we picked up the Betsy Ann barge, lashed it to the Marguerite, and took it with us. Once or twice we struck sand bars, but it was nothing serious. The approximate length of the two boats lashed together was 50 feet—perhaps a few feet more than that. I was on the upstream trip when they brought out the drilling outfit. The Marguerite's load may have been two or four tons. We were on bars quite frequently and made the 95-mile upstream trip in four days. The stage of water was quite low. We left the Betsy Ann at Wimmer's ranch and unloaded the freight from the Marguerite and then continued on up to the town of Green River in the Marguerite with about eight or ten men. We grounded at one place below the Auger and it seems to me that it took us a little while to get over the Auger. Just below Green River bridge we all helped push over the break where the island is located. It is much easier to avoid sand bar trouble coming upstream than down because you can back off the bars; the current assists you. (R. 2385-91, Vol. 13.)

In 1915, Seaboldt and others were drilling a gravel bar at Good Hope and at Tickaboo for gold and I worked for them until October, 1915. I ran my light boat between Hite and Good Hope, about 18 miles up and down the river for those parties, bringing freight and mail to them. (R. 2393-5, Vol. 13.) In 1916, Ellsworth Kolb and I boated from Glenwood Springs, Colorado, to the Cisco pump house on the Colorado

River, my recollection being substantially the same as Mr. Kolb's testimony concerning that trip. (R. 2396-7, Vol. 13.) I was on the Green River with the Trimble party in 1922, as head boatman and had substantially the difficulties enumerated by other witnesses who have testified about that trip. My next river trip was with Colonel Dent from the mouth of North Wash downstream. We had a semi-keel boat with a round bottom, 16 feet long, and equipped with an Evinrude motor. We left North Wash about 1 o'clock September 1, touched bottom a few times between there and Red Canyon, but "nothing serious"; we also touched bottom with our oars at Trachyte, but didn't use our power through that or any other bad water. Opposite Olympia Bar I had to get out and nose the boat around to get it where it should be. The stage of water was not extremely low, about 12,000 or 14,000 second feet. Between North Wash and Lees Ferry, I remember only one place below Halls Crossing where it was necessary to get over board. At Shock Rapid I took the same channel I had previously taken, but it proved to be the wrong one and I had to zigzag to the other side and we got through. There was no more trouble until we got below the San Juan, where we saw some pretty big sand waves. Five miles below Navajo Creek we had nice sailing to Lees Ferry. When I made my first trip in 1908, there was no place in Glen Canyon that you could not walk on one side or the other of the river while there are many such places today. (R. 2398-2406, Vol. 13.) Between 1908 and 1914, all of the traffic in Glen Canyon that I remember was with 16 or 18-foot row boats. Bennett had a boat or two and did most of the running up and down the river at that time. Lon Turner had a 34-foot steel boat. I met Julius Stone and his party. (R. 2407, Vol. 13.) The only differences I recall in conditions on the Green River during my acquaaintance with that stream are that in 1907, the main river ran along the right bank above Green River bridge with a very

small channel on the east side and now there is an island there in low water and not much of a stream on the right bank in high water. (R. 2408, Vol. 13.)

When I took the 1907 trip with Russell and Monette, Monette had never rowed a boat across the river and Russell might have been on some river before but he had never before seen a rapid. Neither of these men had ever before seen the Colorado River so far as I know. I myself was not then familiar with the Colorado River below the Stanton dredge but "I had done a whole lot of boating on the San Juan in 1894 and 1895." (R. 2426-7, Vol. 13.) I have gone up the Colorado river with my boat for nearly as many miles as I have gone down it, but I rowed upstream ten per cent of the time and towed ninety per cent. (R. 2431, Vol. 13.) Generally speaking there is no difficulty in avoiding sand waves by getting off either to one or the other side of the stream. (R. 2437, Vol. 13.)

In 1921, when I was at Fowler's camp, 17 or 18 miles below the mouth of Rock Creek on the Colorado River in Glen Canyon, I borrowed Wimmer's outboard motor boat and went 15 miles up the river and back in that boat. I had never before operated an outboard motor boat. I had no trouble in going either up or down the river with Mr. Wimmer's boat. (R. 4862-4, Vol. 27).

William L. Marrs testified: In 1921 and 1922 I was employed by the California-Edison Company on the lower Colorado. Exhibit 408 is a picture of a power boat I operated on that river; it was 26 feet long, 5 feet wide, a tunnel stern boat with propeller, and was brought to Lees Ferry in August, 1921. On our first river trip we left Lees Ferry with a crew of three persons and seven or eight passengers and supplies; the propeller would kick all the water out of the tunnel and the boat would settle on the sand and when we would drift back a ways we would lose more distance in a minute than we could make going

forward in fifteen minutes; the boat had a draft of a foot loaded; we sometimes carried a line ashore four or five times a day and on that trip only made nine miles in two days. We hauled supplies to the Fowler camp and as required would move the camp two or three miles to another place. I don't know how many trips we made in 1921, but didn't cross the Utah-Arizona line more than six or eight times, on one occasion going up as far as Mile 68. (R. 2450-6, Vol. 13.) A flood would usually take out a majority of the troublesome bars and for a few days thereafter we would have the best traveling and then would have to pick our way through the bars. Our first trip was about August 1, when the water was at low stage and we could only make one or two miles per hour upstream. The channel of the river was never the same. We would make a trip one week and next week would find a dozen new bars. A bar will form in the quiet water and I do not mean to say that the channel is never the same anywhere. In operating my boat I didn't always pick the deepest water because of the swift current in the deep parts, and if it is not swift there is a bar. When I speak of channel I don't necessarily mean the deeper part of the river but I mean where I went through with my boat and I didn't travel the deepest water because I couldn't make progress. Going downstream I would steer along the deep portions of the channel but would encounter a bar every mile or two. (R. 2457-63, Vol. 13.)

Later I installed a new paddle wheel on the boat and had very much better luck and could make more progress upstream at all stages of water. With the new paddle wheel we would get stuck on bars it was not as bad because the boat didn't settle on the bars as formerly. Almost every day the crew would have to get overboard and assist the boat off a bar and try to find another channel of sufficient depth. (R. 2463-5, Vol. 13.)

In 1922 I built a new stern wheel and new bow for

the boat; that year our work was within about 10 miles of Lees Ferry and we had less trouble. From Bridge Canyon down to 10 miles above Lees Ferry the condition of the river is practically uniform. We called this boat the Navajo and Exhibit 409 is a picture of it after the paddle wheel was installed. (R. 2465-7, Vol. 13.)

I marked the places where there were obstructions to navigation with piles of rock unless there was some natural object there to designate such a place. I did this because if I knew when I was approaching a bad place it would enable me to steer by it with greater ease. When I took Mr. Loper and the cook upstream I did not attempt to mark the river because I knew that was out of my territory and that would be my only trip, my territory being below Warm Creek. I had no chance to observe any changes in the bars or river bed above Warm Creek and the changing conditions that I have referred to are all below the Utah-Arizona line. I endeavored to fix the places where I had encountered difficulties because I expected to encounter that difficulty on succeeding trips. Very few of such markings were of value because the channel changed before I got back, but nevertheless I continued the practice with the expectation that I would meet the same difficulty there. (R. 2468-72, Vol. 13.) In 1922 we put a larger paddle wheel on the boat and used a slower speed engine, which was an improvement on the smaller paddle wheel, and we managed to get up the river without towing so much. Never having gone up to Warm Creek after the big paddle wheel was installed, I have no knowledge from actual observation as to what trouble I might have encountered on that trip. When I took Loper up the river we had the small paddle wheel on the boat; the journey was approximately six days and was an average trip. (R. 2479-81, Vol. 13.)

Franklin Thomas testified: I am a civil engineer and in 1922 was in Glen Canyon, entering the river at

Halls Crossing, where Mr. Wimmer met us with four boats. They were 16-foot skiffs with square ends and two of them were equipped with Evinrude motors, the others having no motors. There were sixteen men in our party and we tied two boats together in tandem fashion with a motor in each of the two stern boats. We shipped water at the worst rapid but ran them all and did not wear life preservers. I don't recall grounding on the rapids but on one or two occasions we grounded on rock ledges a short distance above the rapids and were probably aground several times a day on sand bars, but it usually did not take more than five minutes to get off. We left Halls Crossing September 8 and arrived at Lees Ferry September 16, our purpose being to investigtae the possibility of obtaining water and power for Pasadena. We carried supplies and bedding with us and in one boat with six passengers we had somewhere between 500 to 1000 pounds of supplies and equipment; thus loaded the boat had a draft of 9 or 10 inches. (R. 2487-94, Vol. 13.)

We made frequent stops to examine dam sites. I have no recollection of any occasion when both boats were stuck on the same sand bar or at the same time and half the time the two parties there were traveling within a short distance of each other. We saw no sand waves. I would say that on this trip one or the other of the boats would get stuck on an average of twice in a half day's traveling. Because two boats were traveling in tandem fashion there was the additional weight in handling them and in getting them clear. I only have one distinct recollection of any boatman stepping into the river to help get a boat off a bar but I would say this happened twenty times on the trip. (R. 2495-9, Vol. 13.)

Benjamin D. Harshberger testified: In 1906, 1907 and 1908 I went to Hite on the Colorado and did some prospecting, ferrying our equipment across the river there and hauling it up into White Canyon about 30

miles from the river. We crossed at Hite in a boat and a few times were able to get our animals across so that they only had to swim perhaps 20 feet. (R. 2509-17, Vol. 13.)

Richard Elmer Caldwell testified: I am a civil engineer and was on the trip described by the witness, Franklin Thomas, being then State Engineer of Utah. I now reside in Los Angeles. Our boats were 20 feet long with a 5-foot beam and drew a foot of water. I made a notation as to these boats. I took no soundings and don't recall any one else doing so on the trip. We occasionally were caught on sand bars but thought nothing of it. At points where we got on a sand bar we were always able to float after we pushed the boat into deeper water, and it may have been that our getting stuck was occasioned by our not getting into the deeper portion of the river at that point. (R. 2522-8, Vol. 13.)

Frank Barnes testified: In 1910 I went to Lees Ferry where I was employed by Charles H. Spencer's company. I saw an 18-foot launch he had there and operated it on an upstream trip about midsummer. We made a lot of trips to try out the launch and made one trip with it and a row boat from Lees Ferry up to Dandy Crossing with three other men. We had to line the boat a good many times. We stopped on the way to make placer mining locations. When we left we had 500 pounds of provisions. At one rapid the launch was carried on to a rock and turned over; on two occasions our row boat turned over. (R. 2533-6, Vol. 13.) On our return journey we had no difficulties, there having been a rise of water. Later a larger boat was brought to Lees Ferry; it was 26 feet long with a 5-foot beam, a 2½ foot draft, and was equipped with a 40-horsepower gas engine. We took this last mentioned boat and a scow up the river in August, 1910, to get some coal and were stuck on sand bars about ten times. On

the return journey we ran on to sand bars about twice. Going upstream with this boat if you didn't hit the current just right, the boat would turn around. (R. 2538-41, Vol. 13.) We didn't take a line to shore to assist in getting either the launch or the row boat off from sand bars; just hand-spiked the boat off the bar and let it swing clear. (R. 2544, Vol. 13.)

I saw sand waves on the Colorado River but they were usually confined to the center of the stream and most of them were below the mouth of the San Juan River. We had some difficulty in navigating them. (R. 2549, Vol. 13.)

Lewis Ransome Freeman testified: I am an author, explorer and world traveler and have written books concerning several rivers, including the Colorado River. I have found no evidence that the upper Colorado was ever boated by Indians. (R. 2553-70, Vol. 14.)

In August and September, 1922, I went from Lees Ferry to Halls Crossing with a party of six. We had four 18-foot boats, one equipped with an Elto and three with Evinrude motors, the purpose of the trip being a government survey for dam sites. (R. 2571-5, Vol. 14.) During the first 6 or 7 miles up from Lees Ferry we had no serious sand bar trouble, except that occasioned by the faults of our own navigation; next day we made 10 miles upstream with very little difficulty from sand bars; on the third day there was a very spectacular cloudburst but I don't recall that it had any effect on the river. Mr. Wimmer, who was more familiar with the river and a better hand with outboard motors, usually got ahead of the rest of us and would come back and help someone along. He had warned me that a plunger pump was entirely useless and showed me a practical way of avoiding the effect of sand and silt on our motors. (R. 2576-82, Vol. 14.) In the first 40 or 50 miles we encountered nothing that by any stretch of imagination could be called a rapid, the nearest approach to

a rapid being at Aztec Canyon. The engines in my boat and in that of another member of the party there became out of commission, whereupon Wimmer lashed his boat behind one of the other boats tandem fashion and the other two boats were simply fastened together, each unit thus having a length of 36 feet, and in this fashion we continued on upstream with one motor in each rear boat, aiding the motors by rowing. I can't estimate the number of times we got stuck between Warm Creek and Halls Crossing; sometimes our trouble was with sand bars and at other times from rocks and current. (R. 2583-6, Vol. 14.) We averaged slightly better than 10 miles a day. After reaching Halls Crossing I took a boat and with three companions went upstream from there 10 miles through Bullfrog Rapid and to a creek above that point. On our return journey to Lees Ferry we had occasional groundings on sand bars—perhaps a few more than on the upstream trip, our boats being more heavily loaded coming back. There were only five in our return trip party and we went down with the four boats tandem fashion as on the upstream journey. Going down we spent something like a week on the river, making stops, side trips and surveys. (R. 2588-90, Vol. 14.) I did not make any specific observation as to the location of any change in the channel between the up and downstream trip; we occasionally remarked that the channel had changed here and there or we might have said that the water was shallower than it had been, but one takes that as a matter of course in any sand bar river; you get it anywhere. (R. 2593, Vol. 14.)

Our Evinrude motors were 3 or 4-horsepower and my Elto motor was 3-horsepower. Each of our units consisted of two boats lashed together and were powered by one of these motors. Our downstream trip was easier than upstream, the difference between the two trips being "just the difference the current makes, inseparable from all up and downstream navigation." With clean water you would have no motor

trouble; the outboard motor has no radiator. (R. 2594-5, Vol. 14.)

Herman W. Freeze testified: In 1911, I was employed by the American Placer Corporation of Chicago at Lees Ferry. The company had a boat called the Charles H. Spencer, which was around 80 or 100 feet long. Exhibit 416 is a picture of that boat. On its first trip it brought three or four tons of coal on the front of the deck; on the second trip it brought a little more; and on the third trip it brought fifteen or twenty tons of coal, used for firing the boilers at Lees Ferry, where we also used driftwood for fuel. (R. 2599-2604, Vol. 14.) The company also had two small gasoline launches, one of which was intended for use in bringing down the barge loaded with coal, but it couldn't make the upstream trip and I recall their using it for pleasure trips once or twice. The other launch was used for gathering wood on the river and for other purposes. I don't know whether the Charles H. Spencer was used after I left. (R. 2605-6, Vol. 14.) I wouldn't say whether or not they made some trips in the two launches while I was there. On the upstream trip I think they took food on the Charles H. Spencer for the miners; the boat had a crew of about five or six men. In operating the Charles H. Spencer they had no trouble when that boat was observed by me or when it was observable from Lees Ferry. (R. 2619, Vol. 14.)

F. J. Weber testified: I have been on about 45 miles of the Colorado River in the vicinity of Dandy Crossing; went there in 1891 and remained until about July, 1892, placer mining. I was taken from Hite to Good Hope bar in a boat; saw other men use boats but didn't use them myself. They would go up the river and bring supplies down on skiffs. There was a scow 22 feet long and 7 feet wide used at and about Hanson Creek. (R. 2624-9, Vol. 15.) Stanton's company had many wagons and horses with which

they brought supplies and freight over to the river. (R. 2630, Vol. 15.) The scow I mentioned was built at Dandy Crossing, and taking it down the river to the dredge it grounded about seven miles below Good Hope bar; loaded, its draft was 14 or 15 inches. The dredge began operating in 1899 and shut down in the early summer of 1901. (R. 2634-6, Vol. 15.) The scow would carry as much as three thousand pounds of coal at a trip. The coal came from a point midway between the Henry mountains and the river, a distance of about 17 miles from the mouth of Hanson Creek. (R. 2638-9, Vol. 15.) On the occasion I have mentioned, when the scow got stuck, I didn't know whether it was because we had missed the channel. We found deeper water off to the side. (R. 2640, Vol. 15.) In those days the crossing at the foot of White Canyon, where they had a good-sized boat that would ferry the whole outfit across and on which you could take a wagon and team across, was a well-recognized crossing. (R. 2643-4, Vol. 15.)

G. D. D. Kirkpatrick testified: I am in charge of the Public Survey Office, Department of the Interior, in Salt Lake City, Utah. (R. 2645, Vol. 15.)

In May, 1926, I made a trip in a 20-foot launch of the Moab Garage Company from Moab to Lockhart on the Colorado. The down trip consumed 2½ or 3 hours; we struck two sand bars but had no serious difficulty with them; allowing the boat to drift around, by polling we pushed off. The upstream trip was slower because we kept close to the shore to take advantage of the slower water; went up to No. 1 Well, where I stayed all night. I recall no difficulties on the upstream trip, although we may have struck several sand bars, but I don't remember. We took a different course on our upstream than on our downstream trip, and I think the course of the rapid water was changed, probably due to a change in the river bed in some way. (R. 2674-7, Vol. 15.) Again, in 1926, I went from Moab to No. 1 Well in the same

boat; then on down to No. 2 Well in a 16-foot row boat, with an outboard motor; the only difficulty encountered in the big boat was striking bars, but it was not necessary for us to get out of the boat at any time. We had no trouble with the outboard motor boat, and I don't recall encountering any bars, mud, whirlpools or rocks although the river was low at that time. (R. 2678-9, Vol. 15.) I believe that when we were making our meander survey below Moab we got stuck many times with the small boat at points from 3 to 9 miles below Moab. (R. 2679-80, Vol. 15.)

In November, 1926, I made another trip with the black boat, also in one of our boats and on the big scow of the Moab Garage Company. (R. 2682, Vol. 15.) Our survey parties obtained most of their supplies by trucks and wagons at points near our camp, although some of our supplies were hauled down the river on our boat and on the Moab Garage Company's boat. (R. 2683, Vol. 15.)

On the May, 1926, trip from Moab to Lockhart when, as I testified, there was an observable change in the channel of the river, we didn't go upstream in the same channel that we went down because going up we endeavored to go as close to the shore as we could to take advantage of the slow water, whereas on the down trip we generally kept in the deep part where the current was and on our upstream trip avoided, as far as we could, the path we had followed going down. (R. 2711, Vol. 15.) I don't know definitely about the changing of channels. "I think we changed our course because we thought the river had changed its course." (R. 2712-3, Vol. 15.)

In the meander survey, concerning which I have testified, the course of our boat would sometimes be in the middle of the stream, sometimes along the shore, sometimes we would cross back and forth, and we would often beach our boat and also hug the bank as closely as we could. We would thus, of course, very frequently touch sand. (R. 2715-6, Vol. 15.)

On an occasion when the Moab Garage boat was stuck on a sand bar it became thus stuck when they took the boat as far into shore as they could in order to permit me to keep an appointment I had made to meet Mr. Moore at that point and they probably got stuck because of their attempt to land me. (R. 2717-8, Vol. 15.)

Charles F. Moore testified: In 1928 we made government surveys above Moab and I went upstream from Moab in August of that year in a 16-foot outboard motor boat to a point just below Big Bend—maybe farther up than that. We beached the boat at Big Bend, went to the mouth of Castle Creek and got a small row boat which we used in our downstream survey, crossing back and forth as we worked. (R. 2736-8, Vol. 15.)

In May, 1926, I went from Moab to Lockhart in the black boat of Moab Garage Company, and later made a boat trip to a point 10 miles below Lockhart. I recall no difficulty on the down or upstream trip except there were a few whirlpools and our progress was slow. (R. 2741-2, Vol. 15.) Supplies for our camps below Moab came part by boat and part overland. Part of the time I had no way of getting in touch with the garage so as to know when their boat was coming down, and they would only come when they had special trips to make. (R. 2743-4, Vol. 15.)

Robert C. Yundt testified: I am a Surveyor with the U. S. Land Office. (R. 2761, Vol. 15.) In 1926 I was on the survey from a point 10 miles above Moab bridge down to a point several miles below the mouth of Indian Creek on the Colorado. In this work we used an outboard motor boat. At low water sand bars interfered with the operation of our boats. There was one place below Lockhart where the channel would change and at times we would have to go down and around the bar and come into camp from the lower side; at other times the channel would be

free so we would come directly into camp. At other places I have observed that we couldn't always follow the same channel and there would be changes in the channel observable during low water. (R. 2773-5, Vol. 15.) Supplies for our camps came part by boat, part overland. (R. 2776-7, Vol. 15.) In August, 1926, the large Moab Garage boat was stuck on a sand bar for the greater part of a day, and in August, 1927, we were hung up for a short time at one place in going from Lockhart to Moab. (R. 2778-9, Vol. 15.). I never saw any member of our party cross the Colorado River on horseback or afoot. (R. 2780, Vol. 15.)

In 1927 some of our survey work was quite a ways back from the Colorado River. (R. 2782, Vol. 15.) The sand bar difficulties that I encountered on the river were at low water, principally in 1926; in 1927 and 1928 I didn't have much trouble with sand bars. Throughout 1926 the Moab Garage Company was operating its boats, including the big barge. (R. 2785-6, Vol. 15.)

In doing our survey work along the river, we would cross the stream back and forth; would land quite frequently; at times we would hug the shore to get down a little lower, to some desirable point; we would only use the main channel of the river in going to and from work. It was usually more shallow on one side of the river than on the other and when we went over to the more shallow part we more frequently encountered bars. I would say that most of the bars that we encountered in that work was when we were crossing back and forth. We always succeeded in going up and down the river, and when our boat got stuck we always succeeded in getting into deeper water. (R. 2786-8, Vol. 15.)

We surveyed about ten miles inland to the east from our camp at Lockhart. The average width of our survey along the river was five miles, and we had camps that were 5 or 6 miles off the river on both sides, with five to seven men in those parties. The

camps of the parties working on land were in most places inaccessible from the river. Each party had a pack train. One truck load would supply the different parties. (R. 2788-90, Vol. 15.)

Howard W. Miller testified: I am employed in the execution of public land surveys for the U. S. General Land Office. (R. 2799, Vol. 15.) In October, 1911, I located a ford across the Green River at a point about a mile east of the mouth of the San Rafael and took our stock across there without swimming them; I would say that the depth of the river at that ford was about three feet on that occasion. (R. 2806-7, Vol. 15.)

Carl S. Swanholm testified: I am U. S. Cadastral Engineer, and from September 1st to the early part of December, 1926, was in charge of the meander survey work below Moab. (R. 2828-9, Vol. 15.) One of our camps was just on the outskirts of Moab. Most of our supplies for our lower camp were taken down the river on a barge but some of them were taken down on a small boat. At times when the barge didn't go below Well No. 1 we would have our supplies delivered there and take them thence to our camp by pack outfit, or we would go up with a small boat and bring them in. (R. 2829-30, Vol. 15.) About December 1st I made the trip upstream on the Moab Garage barge and it consumed an entire day because we frequently struck a sand bar. In 1926 our party had a boat which I operated most of the time. We used it to transport us up and down the river in making our surveys. It had an Evinrude motor and drew 10 to 12 inches with a light load. With that boat we were frequently delayed on bars and the shearing off of propeller blades occurred. I believe it required the replacement of one propeller blade during the 1926 season. I sometimes noted changes in channel occurring within 24 hours and at other places the channel would remain the same during the

entire period we were there. (R. 2830-4, Vol. 15.) The surface of the water at that time was from three to four hundred feet in width and I once waded the river at the mouth of Mill Creek before we had a boat available and the maximum depth was about thigh deep and the current 5 or 6 miles an hour. (R. 2835, Vol. 15.) In 1927 I went down the river on a Moab Garage Company boat to Lockhart and there used the same outboard motor boat I had used the previous year. The section of the river around Lockhart was no more difficult to navigate than the upper portion with which I am familiar. The river channer there is better water than in the upper portion and the channel can be found with less trouble. (R. 2836-8, Vol. 15.) When I went out, in 1927, I went up the river in the black boat of Moab Garage Company, trailing our outboard motor boat. In 1928 I went down to a point known as the loop, located about six miles above the junction of the rivers, on or about October 20th, taking with me two 16-foot boats with outboard motors. (R. 2840-1, Vol. 15.) The work that year was of the same general character as I have described before, and we used one or the other of our boats in the progress of the work. I encountered more submerged rocks in the lower section of the river, whereas in the upper section our delays were usually occasioned by bars. When we would strike a rock and shear off the propeller it would be necessary to install a new pin, which we would do and then proceed. Four of us went upstream with our two boats about December 15th when ice cakes were running in the river, and we would try to avoid them; sand bars offered no more trouble than in the past. (R. 2842-3, Vol. 15.) With our inboard motor boat we had a metal projection that fends off obstructions from the propeller. (R. 2848, Vol. 16.) One of the government camps was at Indian Creek, located several miles back from the river. In 1927 that camp may have been a sort of distribution point for other camps working on the east side

of the river. There was a road to that camp. My Lockhart camp was about 20 miles from that camp and about 8 miles from another inland camp. At Lockhart I wouldn't always be advised when the Moab Garage boats would leave. After the first trip down to Lockhart, when I took our supplies on the barge, we obtained one or two additional small consignments by bringing them down in our small boats from Well No. 2 where the barge had delivered them. While at Lockhart we obtained some supplies from Indian Creek and some from the other inland camp about 8 miles away. It would have been necessary for me to make special arrangements with the Moab Garage people had I desired to have them deliver supplies by boat to Lockhart. (R. 2850-3, Vol. 16.)

L. L. Taylor testified: I publish a newspaper at Moab and my father started the first ferry boat on the Colorado River at that point. As a boy, I have gone swimming in the river and have been in row boats during all seasons of the year. The channel of the river occasionally changes a little bit at Moab. I recall such changes at the mouth of Court House and Mill Creek, where sand bars and drift wood will obstruct the river at times, almost putting a small dam across it. (R. 2855-7, Vol. 16.) Sometimes the river is 10 or 15 feet deep for quite a distance across and at other times during the dry season it is not so deep. When I was a boy I have waded the river and have seen cattle driven across, but I don't think I ever saw cattle taken across when it was not necessary to swim them. I have been two or three miles downstream in row boats and have noticed no change in channel over that stretch. I have taken boat trips on picnics up and down the river and went down the river in December, 1925, and also in April of the previous year to Well No. 1. We encountered no sand bars on the April trip, but on the December trip we were heavily loaded and stuck on a sand bar about noon. We proceeded to eat our dinner and before we

had finished the barge drifted off the bar. (R. 2858-61, Vol. 16.) While drilling operations at the oil wells were in progress, I was many times in sight of the Colorado River, where I could see the Moab Garage barge, and I never saw it stuck on sand bars. I don't know of any occasion when the merchants of Moab brought in any merchandise or supplies on the river and don't know of any fruit or agricultural products being shipped that way. (R. 2862-3, Vol. 16.) I know of lumber being rafted down the river and of oil being transported up the river on boats. I have knowledge of several barrels of oil being thus transported and later taken to Lasal for use in dipping cattle. As a boy around the river I have seen several rafts of lumber come down to Moab from Castle Valley, 25 miles above. (R. 2864-5, Vol. 16.) This lumber was rafted from a point on the Colorado River above Castle Creek down to Moab. It is difficult for me to describe the rafts which I saw some 25 years ago, but I would say that a raft would be 40 or 50 feet in length and possibly half as wide; they would contain several thousand feet of lumber, and it was the easiest way to get lumber down because the road was very bad. Usually two or three men would ride the rafts. I know of equipment of various kinds, including machinery, also freight of other character, that came up the river from points below Moab. I recall several instances of people coming down the river in boats prior to the time when the Moab Garage Company started to operate; I think these people continued on their journey, and have personal knowledge of their coming down the river to Moab and then proceeding down the river on their journey. (R. 2866-71, Vol. 16.)

I recall the Undine coming upstream to Moab on several occasions; I personaly saw it arrive there on several occasions but wouldn't undertake to say how many passengers there were on board. Later it was wrecked at a point two or three miles above Nigger Bill Canyon where the river is narrow and

the water swift. (R. 2872-3, Vol. 16.) As editor of my paper I have kept in close touch with the operation of Moab Garage boats during the past few years and think those boats made trips with reasonable regularity. I know they had lots of delays but they hauled a lot of freight and for a long while were making trips pretty regularly. I believe I saw one of Mr. Wimmer's boats at Green River and know that he came with a boat once or twice to Moab but I didn't see his boat; I have also heard of Mr. Wolverton in connection with operations on the river. (R. 2875-7, Vol. 16.)

John B. Cleary testified: I am a civil engineer and for 11 years have been in the employ of Midwest Refining Company. My company spent approximately two million dollars during a period of 2½ years in oil operations between Moab and Lockhart. It has no present interest in drilling operations there. I first went to the river on December 31, 1925, going to Well No. 1 on the Moab Garage barge. About half way down we stuck on a sand bar for almost two hours, taking a line to shore to pull the boat off. I remained there seventeen days staking ground covered by permits, etc., and investigating a road. (R. 2895-2902, Vol. 16.) Transportation is always a problem in a producing oil field and at times it is necessary to get freight in promptly. With the method of transportation then being followed, it was necessary to unload from the cars at Thompson, unload again at Moab and reload onto the boat and then unload at destination. There is seldom a producing oil field with less than three wells, and the size of a Moab Garage boat then in use was not sufficient to supply a producing oil field; it might require twenty such boats. (R. 2903-11, Vol. 16.) When I speak of bringing in material for a producing oil field I have in mind a 5-year period. A complete drilling rig for a depth of 4500 feet weighs a million pounds, in round figures. (R. 2912, Vol. 16.) Exhibit 461 is a recon-

naissance I made for a pipe line. (R. 2914, Vol. 16.) Exhibits 462 and 463 are maps of a road survey I made for the proposed road to Well No. 1. (R. 2922, Vol. 16.) I have taken three trips on the Moab Garage Company barge; it had sand bar trouble on my first trip only. I was frequently on the Colorado River with the small passenger boat with which we got stuck on sand bars at diffent times and at other times made the passage quite freely. At every trip we found a shifting of channel which would at times occur within a few hours; at times I believe we found the channel in the same place. (R. 2925-6, Vol. 16.)

Our purpose in making the road survey was to prepare an estimate of the cost of a road in the event that we had a producing oil field. (R. 2930, Vol. 16.) I am not sure whether my company was one of the defendants in the suit brought by the State of Utah and Texas Oil Company. (R. 2944, Vol. 16.) It is not necessarily the practice of my company to make a reconnaissance before they go to the expense of getting their equipment and supplies on the ground for drilling operations. (R. 2949, Vol. 16.) When my company expected to drill at Elk Ridge it built a road before any drilling operations were commenced. (R. 2952, Vol. 16.) I think the Moab Garage boat would cost about one and a half times (possibly twice) as much as the type of truck I had in mind for use on a road. The truck would carry six tons and that boat would carry fifteen tons. We didn't at any time contemplate the construction of a road until and unless a producing oil field was developed there, and until that time we decided it to be more feasible and practicable to use boats on the river. (R. 2954-5, Vol. 16.) In making my estimate of comparative costs of land and river transportation I assumed the cost of the Moab Garage boat to be $12,000.00; however, that is a guess. If Mr. Clark, who owned the barge, has testified that it cost $7,000.00, my answer as to the comparative costs of

truck and boat should be changed. In such event, my estimate of the cost of the two would be about the same. A truck of the type we used cost $6,685.00. (R. 2956, Vol. 16.)

Walter F. Edwards testified: I am a civil engineer employed by the Midwest Refining Company, and on my first river trip accompanied Mr. Cleary from Moab to Well No. 1 on the barge of Moab Garage Company. I surveyed the boundaries of the permits and used a motor boat called the Riff Climber to take us to our work up and down the river. We had trouble with sand bars. On January 25th I took a trip on the big barge and we had some trouble at the mouth of Bull Canyon, where we had to cross to the other side of the river because of a cross channel. I made another trip on that barge on March 25th, but recall no trouble. (R. 2960-4, Vol. 16.) While I was in that section I was on the river practically every day; we didn't have trouble every trip, but almost every trip, especially in crossing the river and on trips to Moab on the larger boats. Our only trouble was running on sand bars. We didn't always find the channel in the same place, but it was easier to find in extreme low water because the bars were then up, more or less exposed. At extreme high water our greatest trouble was in following what we knew to be the best channel in crossing from one side to the other. "In traveling up and down the river as many times as we did, we of course got to know places where the water was the deeper, and at extreme high water there was enough back eddies along the banks to aid considerably in going upstream rather than trying out in the main channel." But occasionally, in going up along the bank, we would run into where we knew there were submerged rocks because we had seen them at low water and we would then cross the river and try another channel on the other side and might get into trouble with sand bars in the middle of the stream. (R. 2971-3, Vol. 16.) I don't know

whether I would have had any trouble if I had followed the same course in high water that I followed in low water. When taking advantage of the eddies along the side, we didn't as a general thing have difficulty in getting out of them back into deeper water. (R. 2974, Vol. 16.)

John L. Dugan testified: I am superintendent of Utah Southern Oil Company. In 1924 I went by motor boat from the mouth of Mill Creek to the present site of the Frank Shafer well. We made the round trip that day, spending an hour at the well site; the river was flowing slush ice, which caused us a good deal of trouble, but we had no serious difficulties with sand bars. (R. 2984-7, Vol. 16.) My company was interested in all of the wells that were drilled down the river except one. In December, 1924, and August, 1925, I made river trips in row boats equipped with an outboard motor and took one trip on the Moab Garage boat when we had a great deal of trouble with sand bars. On the last mentioned trip we started late in the forenoon of one day and did not return until the evening of the following day, although we started upstream shortly after breakfast. In January, February and March, 1926, I was on the river several times, invariably going down on the barge, which was then hauling considerable material. On most of these trips we had trouble with sand bars; except on two or three occasions, we would leave the boat a mile or two above camp and walk into Moab because it was quicker. (R. 2988-90, Vol. 16.) Between June and October, 1926, I made a number of boat trips, going down on the barge a few times and at other times on a motor boat. When our operations commenced, we rented a Moab Garage boat and drove it ourselves, and between July and the early part of November I made at least three trips a month down to Lockhart, most of the time running my own boat. The channel of the river changed rapidly from trip to trip, and we had to keep

a careful watch for it. The most rapid changes seemed to be in July and August, when we had thunder storms, and it was at that time that we encountered the greatest trouble with bars; the streams coming in from the side would carry more silt and would change the speed of the current and start a shifting of the bed of the river. (R. 2991-3, Vol. 16.) From former experience I knew the place where the channel would pinch out and be shallow all the way across and generally tried to go through at the same point where we had gone through before. Notwithstanding this knowledge, I would get out and walk clear across the river to find a place to come through. We practically always found a place where we could get a boat through, but it was very limited and the water was shallow. It was practically 22 miles from the Frank Shafer camp to Moab by river and from the place where we would get off and walk it was eight miles to Moab. The Moab boat landing was a trifle over three miles from the town of Moab. My company still technically retains its interests in those wells and is one of the defendants in the suit commenced by the State of Utah and Texas Oil Company v. Midwest Refining Company, Shafer and others. (R. 2994-3001, Vol. 16.) On those reefs would run clear across the river at low water, we would get 8 or 10 inches to a foot in depth when they gave us trouble; a number of times that would be the maximum. There were two or three points between the Moab landing and Kane Creek which gave us quite regular trouble in 1927 and 1928; at times the channel would extend through but at other times it would be very shallow. At the times I speak of the Moab Garage Company was not operating regularly but when it did operate, its boats came through the places I mention. (R. 3002-3, Vol. 16.)

Herman Rosenfelt testified: I took part in the building of the boat known as the C. H. Spencer. Its hull was 80 feet long, it had a 12-foot stern wheel with

six inches clearance, thus making its length over all 92½ feet. It had a 25-foot beam and drew 18 to 20 inches of water, empty. After it was constructed in San Francisco it was shipped overland to the mouth of Warm Creek on the Colorado River. It was a steamboat, the boiler being 8 feet in diameter and 10 feet long. After being assembled at Warm Creek it was there launched in the river and everything was tested out and found all right, the boat being run up and downstream for 100 yards or so in making these tests. Exhibit 469 is a picture of a part of the frame of the boat and Exhibits Nos. 467 and 468 are pictures taken right at the mouth of Warm Creek. It burned coal for fuel, the coal being obtained from a vein 12 or 14 miles up from the mouth of Warm Creek. Its cost was not less than $30,000.00 (R. 3006-14, Vol. 16.)

Jeremiah Johnson testified: I was born in 1876, and Lees Ferry has been my home most of the time since then. My father ran the ferry for 22 years and I assisted him, and also ran it many years. It was about 40 by 18 feet. We also had row boats that we used. (R. 3015-16, Vol. 16.) I made a trip with three 14-foot boats and one 18-foot boat, which had a motor in it that didn't work, from Lees Ferry to Bull Frog Creek, located about a mile above Hall's crossing. There were fifteen in our party and our 135-mile trip upstream consumed twenty-one days. Between riffles we were able to row the boats at short intervals. At the riffles there were sand bars and rocks. After we delivered these boats we obtained two old home made row boats and came back down the river. The larger of these row boats was 18 feet long and the smaller one probably 14 feet long. We made the downstream trip in two days. (R. 3017-18, Vol. 16.)

I remember the boat called the Charles H. Spencer which they used for pushing barges from Lees Ferry up to Warm Creek to haul coal. I never made the trip to Warm Creek on that boat but I helped get

them started and would help them unload and in other ways after they arrived at Lees Ferry. The Charles H. Spencer made two round trips from Warm Creek to Lees Ferry and another downstream trip to Lees Ferry. The barge that they built to use with the Charles H. Spencer got away from them and went down the river so they used our ferry boat in its place. On one trip they had five tons of coal down in the hull which was never unloaded. The coal they hauled on the barges they used for their boilers and some of it for blacksmith purposes. I suppose they brought seven or eight tons down on the ferry boat. The same people had some other boats one of which was 40 feet long and 6 feet wide and called the Violet Louise. It was equipped with a 40 horse power gasoline motor and had a propeller. I never took any long trips on that boat but have ridden around Lees Ferry in it. It went up to Warm Creek on one occasion and during the flood got loose and I caught it and brought it to land at Lees Ferry. That was about the year 1912 and the boat hasn't been used since. The company operating these boats was called Nome Gold Dredging Company. (R. 3019-24, Vol. 16.) The same company had a Mullins boat made of metal and 23 feet long by 4 feet wide, equipped with a 35 or 40 horse power engine. I saw them go upstream with it but didn't accompany them. They ran the motor at such a high speed that they burned out the bearings and rowed it coming back downstream. They put in new bearings and made another trip or two upstream to Warm Creek. Later it was taken to Lake Mary at Flagstaff and used for a pleasure boat. The same company had another metal boat and wooden boat equipped with small engines of not more than 10 horse power. These boats got away and went down the river. On one trip I went four or five miles up the river on the Charles H. Spencer and for three days it was on the sand at a point a mile or a mile and a half above Lees Ferry. (R. 3025-6, Vol. 16.) On my trip up-

stream with the Stanton boats in 1898 I found that the water below Warm Creek was better than above; not so many rapids or such swift water. The Nome Company had two barges anchored together about a quarter of a mile below Lees Ferry and installed dredge machinery on them. They were dredging sand from the bed of the river. (R. 3027, Vol. 16.) Once I saw the river rise a foot an hour in twenty-four hours at Lees Ferry as a result of heavy rains. There was one year when the rise was greater than ever known either before or since; that was in 1884, and I can just remember. I marked the place to which the river came by a fork in a tree in our orchard. I suppose that mark might be 20 or 25 feet from low water mark. (R. 3029-31, Vol. 16.) Aside from the one trip I took upstream with the Stanton boats, I have only made one trip up the Colorado River above Warm Creek, and on that trip went only five or six miles above Warm Creek in a row boat. All of the fifteen men who went with me on my upstream trip with the Stanton boats came back down the river with me, making the 135 miles in two days. Going upstream with the Stanton boats we poled and rowed some, towing when we came to a good place where we could walk along the bank and in other places rowing. Coming downstream after delivering the Stanton boats there were seven men in one boat and eight men in the other. (R. 3035-8, Vol. 16.) The Johnson outboard motors are equipped in such a manner that the silt in the river doesn't get in and cut the bearings as it did with the boats concerning which I have been testifying. The Johnson motors are equipped with a small pin in the propeller so that if you hit anything instead of twisting the shaft out the pin is cut out and you raise the motor up and shove in another pin and go on. (R. 3039-41, Vol. 16.)

Defendant's Exhibit 12 is in my handwriting and signed by me. I made the following statement in that letter:

"I found the largest size outboard motor, two-cylinder, to do very well. The bearings are cased in so the silt doesn't bother them. A home-made row boat that would carry one thousand pounds with a Johnson outboard motor will go up the river in fine shape."

When I made that statement I had in mind only some little section of the river and referred only to parts of the river where the water was quiet. (R. 3043-5. Vol. 16.) The Johnson outboard motor that I had in mind when I mentioned it in my letter to Mr. Burdick was a 10 horse power motor. (R. 3047, Vol. 16.)

Frank T. Johnson testified: I was born at Lees Ferry in 1878, lived there until 1896, and have been there at different times since then. (R. 3060-1, Vol. 17.) I never saw the steam boat Charles H. Spencer in operation but remember seeing it when it still had steam up. I recall seeing a few wagons and some machinery on the boat but didn't see any coal then. Later I saw coal brought on our ferry boat and saw some coal on the deck of the Charles H. Spencer. I remember seeing the Violet Louise and the scow, and my brother's testimony concerning the Mullins boat corresponds with my recollection. (R. 3063-9, Vol. 17.) In operating the ferry boat, after my return in 1910, we often encountered sand bars which would sometimes extend nearly half way across the river. We could always get our passengers off the boat; had plenty of plank that we would lay across the sand where it was miry. Usually these sand bars would form after the fall rains, in July or August. I have never been up the Colorado River more than about seven miles in a boat. (R. 3070-2, Vol. 17.) In 1921 I was on the survey for the California Edison Company for two months and came down the river from the mouth of Rock Creek to Lees Ferry with four other men in a row boat. There were a number of places where the bottom of the boat would drag on

the sand, but I recall only one place where we had to get out and lift the boat off. (R. 3072-5, Vol. 17.) While on this survey trip most of our supplies came overland from Lees Ferry, although we received some supplies at one point by boat. The survey was back from the rim of the canyon, at places 15 miles. We had a pack outfit with the party but returned to Lees Ferry via the river because that was the best and easiest method of travel. (R. 3077-8, Vol. 17.) At Lees Ferry there is a sort of point which constitutes an obstruction to the flow of the river, and the sand bar forms on the opposite side from that. I remember seeing Nathaniel Galloway come down the river a number of times—two or three times. He was a trapper and hunter. Once in a while there would be a trapper and hunter come in but I don't recall their names except that I remember Bert Loper. The first one I recall seeing was a man named Mesca when I was about fifteen years old; later, Mr. Galloway came down, and then there were two other men. I later saw Galloway and have a distinct recollection of seeing three other trappers besides him since I returned to the river and up until 1923. (R. 3090-3, Vol. 17.) I don't remember whether Mr. Galloway told me where he came from the first time I saw him at Lees Ferry, but on his second trip he said he had come down from either Green River, Wyoming, or Green River, Utah. I have no knowledge of Galloway or any of the other men going back up the river in row boats. (R. 3098-3099, Vol. 17.)

John W. Palmer testified: I acted as assistant fireman on the Charles H. Spencer steam boat when it made its second trip from Warm Creek to Lees Ferry, which consumed from one o'clock p. m., one day until four o'clock the next day. We were stuck on sand bars and couldn't handle the boat until we put out a big log chain which we dragged in front to hold the nose of the boat straight. We weren't towing any barge, and carried wagons and equipment

on the boat. The upstream journey consumed two days and we didn't use the log chain on that trip. Later we took about five tons of coal down on the boat, that trip consuming about a day, I then went to Paria to work for the same company. (R. 3104-3107, Vol. 17.) I have been to the small coal mine above Warm Creek, which was the first coal mine the company opened. The last time I was at the mouth of Warm Creek I saw about 100 tons of coal there. I know that the Violet Louise was up at Warm Creek, but don't know much about any of the boats except the Charles Spencer. (R. 3107-8, Vol. 17.) While I was at Warm Creek there were about 15 men working there, and supplies were brought there overland. On one occasion the Charles H. Spencer went about a quarter of a mile upstream from Warm Creek; we couldn't go any further, and that is the only upstream trip I recall. (R. 3110, Vol. 17.) On the upstream trip when I said the Charles H. Spencer couldn't go any further, I know that we wanted to go further upstream because Mr. Spencer said we did, but I didn't know to what point. All I know is that we just started to go up the river and turned around and came back. (R. 3112, Vol. 17.)

Edward C. Sumner testified: I have been on the Green River and was on the Colorado River from Hite down to Hanson Creek in the winter and spring of 1897-8 working for the Good Hope Placer Mining Company. (R. 3122-3, Vol. 17.) Supplies came to Trachyte Creek overland, from which point they were boated down the river 15 or 18 miles to Good Hope bar. Our boats were about 16 feet long and 4 or 5 feet wide, and in going upstream they would tow them and when the wind was fairly good they would sail up the river. I have never gone from Good Hope up to Hite by boat myself but have gone from Good Hope to Olympia bar on the river, and on that trip we went right along nicely. Going upstream it was not so easy. At first there was a heavy wind and we

put up our sail, which consisted of a piece of carpet, and went along very rapidly; then the wind went down and it became a question of towing. I can't say that there are any rapids between Good Hope and Olympia bars, but there was some pretty swift water, but no really heavy fast water. (R. 3124-6, Vol. 17.) In 1898 Mr. Stanton brought in a drilling machine to test the bed of the river for gold. The only boats there during my time were skiffs. Mr. Stanton built a large, flat-bottomed boat, upon which they carried the drilling machine; they would drill across the bars and then drop the boat down, pick up the machine and go over the still water; on the rapids they would use a cable and pull the machine across. The drilling machinery was pretty heavy and they didn't take too much chance of grounding. I have no recollection of any ledge running clear across the river in the section I traversed. (R. 3127-9, Vol. 17.)

T. Cummings Bennett testified: I first went to the Colorado River in 1920 at Hall's Crossing, and thence to Hite on horseback. At that time I was working for the Henry Mountain Oil Company, operating across the river from Rincon, about 100 miles above Lees Ferry. I built a raft at Good Hope bar, about 14 feet square and drawing 7 or 8 inches of water, loaded some casing and six inch pipe on it. When we reached Olympia bar we loaded a wagon and stove on the raft. On our trip to Olympia bar we encountered difficulties only once, when we were hung up for a few minutes on a sand bar, but the boat swung off out in the channel and we were all right again. Our load was too heavy for our raft so we got a log and made our raft larger and continued on downstream to Bull Frog Rapid and thence to Hall's Crossing, where we landed and unloaded the raft. (R. 3131-5, Vol. 17.) From Hall's Crossing we continued on downstream with a row boat and our raft, lining our boat at a whirlpool below Lake Canyon rapid, and then continuing on down to Rincon. Then,

with my uncle and two other men, we went back upstream to Hall's Crossing. At one point below Lake Canyon rapid it was too swift for us to row and we towed the boat up the swift water. We made this upstream trip of about 22 miles in two days, towing where we could because it is easier to tow upstream than row. (R. 3135-6, Vol. 17.) We drilled for oil at Rincon, our deepest hole being 140 feet, and while there some of our supplies came from Hall's Crossing by boat and some came to us overland. (R. 3137-8, Vol. 17.) About October 8, 1920, I made an upstream trip from Rincon with Frank Bennett and W. B. Hay in a 16-foot row boat. We made the ten or eleven miles in a day, rowing and towing. We went up to bring down a raft that had stuck at Lake Canyon rapid and to salvage its cargo. I didn't observe a ledge there; where the raft was stuck; it was only knee-deep, and we had to move the raft about 20 feet to get it into deeper water. The raft was 20 feet long and 8 or 10 feet wide, and loaded with a drill stem weighing 1800 pounds and a few drill bits. (R. 3141-4, Vol. 17.) Different rafts were built on each of these trips, the first raft taking down the gas engine and drill rig, which consisted of an engine and wooden bull wheel and the frame of the rig. The first raft was in three or four sections about 10 feet wide and 40 or 50 feet long; they also had a boat with them. All of the equipment used in our drilling operations was taken down the river on one or other of the rafts or in the boat. The equipment carried on the rafts weighed five tons. (R. 3145-7, Vol. 17.) In getting the raft off at Shock Rapid it was necessary for us to get in the water, and we found it about knee-deep there where the raft had caught on rocks. That stretch of bad water was probably an eighth of a mile long. In November of the same year I made another upstream trip from Rincon to Bull Frog Rapid, a distance of about 24 miles, and I believe it took us two days to make that trip because we stopped one afternoon to explore some old ruins.

At Bull Frog Rapids we built a raft 20 by 10 feet, in two sections, and took it down empty to Rincon. At one place below Lake Canyon Rapid the raft got stuck on a rock and I got out and waded clear across and found a maximum depth of two feet. I made a trip to Hall's Crossing, towing, poling and rowing our boat upstream. We left Rincon after lunch one day and arrived at Hall's Crossing at ten o'clock next morning. I waded most of the distance. (R. 3148-52, Vol. 17.)

Frank Bennett testified: I am 64 years old and my occupation has been principally mining. I first went to the Colorado River about December 1, 1897, and worked at the Good Hope and California bars for the Good Hope Mining Company for two or three years. They had a flat-bottomed boat 22 or 24 feet long, with a beam of four or five feet. In July, 1898, I went by boat from the California bar down to the Good Hope bar. We encountered no trouble in going downstream on that trip. (R. 3171-6, Vol. 17.) In addition to the period when I was working for the company, I spent four or five years at the California bar, spending the winters there. I bought an interest in the bar from Mike Ryan, and we had a 28-foot boat and another light skiff that we used. (R. 3179-80, Vol. 17.)

In our operations we took out gold and would either take it out ourselves or send it by registered mail. Once in a while we would make trips between the Olympia and California bars. Aside from using a sail and oars as a method of taking boats upstream, I have had three different motor boats on the river, but that was after I quit working the California bar. We also towed boats, which was an easier method than rowing. The first motor boat I had was in 1902 and I used one of the first automobile engines built, in that boat. It had been used by an oil company; they had tried to construct it as an automobile engine. I tried to get up the Good Hope rapid with that

boat; got it up to the top of the rapids but it didn't have power to go any farther. I tried the stern and the side wheel on that boat and the stern wheel was most effective. (R. 3180-3, Vol. 17.) In 1905 or 1906 I used a propeller motor boat, with which I ran up and down the river. Sometimes I was able to run this boat from Olympia bar up as far as Good Hope bar, where I would load my supplies. At other times I would go up as far as Hite, but I would have to tow the boat over the rapids. It was 22 feet long, 4 feet or more wide, and had a draft of 6 or 8 inches in addition to my propeller, which was 14 or 16 inches. The propeller would strike on the rocks. It had a 12 horse power engine, and during high water sunk at Tickaboo and I took the engine out. In about 1906 I built a motor boat with a tunnel designed to keep my propeller off the rocks. This was a 24-foot boat with a draft of about 16 inches at the stern, and I used the same engine that had been in my other boat. This boat didn't do very well, and I took the engine out and used it as a sail boat; also used oars on it to some extent. That boat is probably still there on the river. (R. 3184-8, Vol. 17.) I have sailed over rapids going upstream and find the water better for sailing when it is at a stage four feet above low water. At one time I put a small outboard motor in a 14-foot boat but the bearings wore out in the muddy water and it didn't really have sufficient power for swift water. (R. 3189, Vol. 17.)

I believe I was on the Colorado River every year from 1897 to 1920 in the section from Hite down to Lees Ferry, but was not boating during all of that time. (R. 3191, Vol. 17.) I recall one experience in 1898 when there was an ice gorge. Hite and two other men were in a boat and I helped them get to shore; they lost their supplies. Several times I have seen ice gorges at different places, and at Good Hope have seen the ice piled 15 feet high on the island. I have crossed the river on ice, but it was where the ice keeps it frozen together, and I have no recollec-

tion of ice ever forming there except on the sides of the river; however, an ice cake will catch and then another will come on top of it and they will freeze together. I don't think the ice ever freezes so you have solid ice across the river, but an ice gorge or ice jam may form clear across. (R. 3191-4, Vol. 17.)

Mr. Stanton had a boat built in Wisconsin and shipped to Lees Ferry. I went down the river in a flat-bottomed boat and came back upstream with the Stanton boat. On the downstream trip I had no real difficulty. I "never had any difficulties in going down, as long as we tried to stay in the middle of the river." However, on that trip we were posting notices and would have to run from one corner of the claim to another, and when we would go into the banks we would quite often run aground. We also had a life boat with us and carried supplies in the flat-bottom boat. "I don't call to mind any time we had any difficulties." (R. 3196-8, Vol. 17.)

I know of two places in the river where there are ledges running across. On that Lees Ferry trip I didn't get acquainted with them, but on later trips down to the mouth of the San Juan I observed them. Mr. Stanton's life boat had quite a keel on it and I recall that it struck while going through Bull Frog Rapid, although nothing was injured. Again, at Shock's camp the life boat got in trouble. There are cracks in the bed rock at that place which are not very wide; we took the life boat over to the right hand side, but still it dragged a little and we helped it over there; that was at the Shock bar. I remember one other place somewhere below there where we had a little difficulty of the same kind; we didn't have any difficulty with our boat but the life boat had a little difficulty. It is shallow at the mouth of Lake Canyon and there is a reef but I don't remember whether it was at that place that we had the difficulty. (R. 3199-3200, Vol. 17.) After delivering the boats to Mr. Stanton at the dredge, just above Bull Frog Rapid, four of us continued on up to Hite,

rowing and towing. (R. 3201, Vol. 17.) I believe I saw the first sand-waves I had ever seen on that Lees Ferry trip. The sand waves are worse when the river begins to rise in the spring and when it begins to go down. I have seen them at most any part of the river at certain times and they are worse below the mouth of San Juan. I prefer an intermediate stage of water for navigation; that is, where it is four or five feet above extreme low water. (R. 3203-5, Vol. 17.) In 1901 I recall taking some lumber down the river from Hite to Olympia bar, about 35 miles below. We made three rafts, each 14 feet square, and fastened them together with cables. I loaded 5000 pounds of machinery and equipment on the raft, also all of our supplies, and with eight men we started down the river in June. In avoiding a dam and race-way that had been built at Good Hope, we had to go over to the other side where there was a big swirl and where we touched the rocks but didn't touch hard enough to hurt anything, and had no further trouble and landed our freight at Olympia bar. Once in a while I would go up from there to Hite in my boat and bring down supplies. (R. 3206-9, Vol. 17.) At one time I moved a Keystone drilling outfit from the California bar up to Good Hope bar, and a few years later took it back down. I took it down in November or December on a raft and in our boat, and it weighed three or four tons. In taking the drill outfit upstream we made two trips. We went up the river with a sail and had the big boat and it was while the river was rising quite rapidly. We used a big canvas for a sail and would wait for the wind. I think our actual traveling time in making that upstream trip was only about a day and a half. (R. 3210-1, Vol. 17.)

At one time I worked a copper property up White Canyon, about nine miles from Hite; I hauled the ore from the mine to the Colorado River with four mule teams and took it across the river in my tunnel boat, and thence over into Green River, Utah. (R. 3212-3,

Vol. 17.) I recall going into that country to drill for oil in July, 1920, when I built a raft at Hall's Crossing in three 14-foot sections. We used some of the drill rig timbers in our raft.

I recall no difficulty encountered in taking this raft down the river except at one point where we got into a bad swirl and the raft went out of sight; it was loaded quite heavily and some of the light stuff was not tied on and drifted off, but the raft bobbed up again a little ways farther down and we were not hung up at any other place and made the trip in less than a day. I also recall building another raft at Hall's Crossing and going up the river to Hite, where we picked up material for the raft, added on to it, and then loaded it with supplies; we had considerable trouble with the raft, but I don't remember being hung up anywhere until we got to Shock Rapids, where we unloaded and then got some of the other boys to come up and help us. (R. 3214-6, Vol. 17.) When the last mentioned raft got hung up we stayed below there for the night; I don't believe we found any water more than two feet deep there. I think the ledge at that point went up and down stream about an eighth of a mile. The only other occasion when I got on that ledge was when we had trouble getting Mr. Stanton's life boat through there, and on that occasion I think we only had to work it for a little ways. (R. 3217-8, Vol. 17.)

The channel of the river shifts sometimes. As a general thing, the shift occurs in high water or immeditately after high water. If there is some obstruction it causes the current to cross and it may shift over a third or half the width of the river quite rapidly. I did not always find the channel in the same place and I have known it to change between trips. (R. 3218-9, Vol. 17.)

I have had very little experience in boating on the Green River. Once I went down the river with Captain Yokey; they had a boat called the Cliff Dweller, and one Sunday ran an excursion down a ways and

grounded. I didn't stay on the boat and walked back up. (R. 3225, Vol. 17.)

I made my river trips during the years that I was on the Colorado in pursuit of my vocation or in the service of others who were engaged in business, and I was not in that country as a sight-seer or gentleman of leisure. (R. 3231, Vol. 17.)

I shipped several cars of ore from the copper property that I worked near Hite, all of which was taken across the river in boats. Some of the carloads contained as much as forty tons, and I must have shipped 200 tons. (R. 3232-4, Vol. 17.)

The shifting of the bed of the Colorado River and the changing of channels in that river generally occurred during the high-water season and immediately following the high water season. After the river settled down to low or normal water, there was very little change in the channel unless something in the way of an obstruction occurred that would tend to throw it to the other side. Such an occurrence would be unusual. Sometimes there would be floods other than spring high water that would have the effect of changing the channel, but that was rather an unusual occurrence. (R. 3235-6, Vol. 17.)

I have known an ice gorge to last for several days, but as a general rule they break in 24 to 48 hours, and longest period I have ever known an ice gorge to last was about a week. At the place at Shock Rapids where I observed the ledge extending across the river, I don't knew whether the cracks continue up and down the river, but I would say that at that ledge the depth of the river was about two feet at a very low stage of water. (R. 3236-9, Vol. 17.) After the late summer floods following cloudbursts, the sand bars would sometimes change and at other times they wouldn't change; after floods they may change a little at some places and at other places they don't change. (R. 3240, Vol. 17.) In 1898 or the spring of 1899, I would say that there were about 75 or 100 men working along the river in the vicinity

at and below Hite; most of them lived in tents. For a long time after 1898 there were twelve men who got mail at the Hite post office, where most every one got his mail. Some of those people lived in little houses, dug-outs, and some in tents. (R. 3241, Vol. 17.)

William R. Newby testified; I am a farmer living at Green River, Utah, and was roustabout of the Cliff Dweller when it left Green River, Utah, in August, 1907. We first hit something above the mouth of the San Rafael and after that went along fine until we hit something else, which generally tells the story down to the mouth of the San Rafael. Between there and Valentine Bottom we had difficulty with sand bars and had a better channel in Stillwater Canyon than elsewhere. On occasions we took a line ashore in order to get off and were compelled to take almost continuous sounding to avoid hitting bars more frequently. On the upstream trip we struck a sand bar about a mile from Valentine Bottom but bobbed over it; at one place we got into a pocket and had to back out and go up mid-stream; at Fort Bottom we found more sand bars which we had to feel our way around; we had difficulty getting around another riffle and finally reached Wolverton Ranch and tied up. We there raised our engines in order to raise the paddle wheel above the bottom of the boat to avoid rocks and went on up to the town of Green River. I don't think the boat drew over 18 inches. I haven't knowledge of any more trips by that boat and think they sold it to some Salt Lake firm. (R. 3242-9, Vol. 17.)

I have made trips on the Green River in other boats but have no knowledge of Tom Wimmer's boat named the Marguerite or the Betsy Ann, and don't know of any boats now tied up at Green River. (R. 3250, Vol. 17.) I remember another steam boat known as the Black Eagle which wasn't half as large as the Cliff Dweller, and I made a little trial trip in that along in 1908 or 1909. It belonged to Mr. Yokey, and

I haven't seen it since. During the periods I have referred to I wasn't down to the river frequently; perhaps only once a year. In September, 1909, I made a trip on a side wheel gasoline propelled boat known as the Wilmont. I went sixty miles down to the Narrows in another gasoline boat called the Dispatch. We got stuck on a sand bar before we reached Wolverton's Ranch, camped there on the shore, and next morning continued on down without further difficulties until we met the Wilmont at the Narrows. I went nine miles around Bowknot Bend in the Wilmont and then the Dispatch, the Wilmont and the skiff owned by Mr. Wolverton proceeded upstream to Wolverton's Ranch, encountering a few sand and gravel bars. We remained there for three days and then went up to Green River in a day with the Wilmont and Dispatch; we made it up over the Brown riffle without grounding and thence on to Green River, Utah, without any trouble. I made another trip in the Dispatch from Green River, Utah, to Little Valley of about the same character as other trips. On one trip I made in a four-oared boat belonging to Yokey I was hung up on a flat rock close to Little Valley; had quite a little trouble getting loose and then went on down all right. On another trip we abandoned the Slapping Sal at a point below Tenmile Bottom. That was in December, and next spring we got the boat back again. At Trap Ford, above my place at Green River, Utah, the channel has changed 200 yards from its original place, the rocks that used to be there having now disappeared and the riffle being 200 yards below where they used to ford; above there the river has moved about its width; and, in 1905, Saleratus Wash, which comes in at Green River, Utah, was probably 50 or 60 feet wide and is now 200 yards wide. I don't know of merchandise ever having been shipped to Green River via boat. (R. 3251-60, Vol. 17.)

Molly Newby testified: I was on one trip in the Dispatch mentioned by my husband, William R.

Newby. I never saw the Black Eagle or Wilmont but saw one of Yokey's row boats and I don't know of any boats on the Green River now, or of merchants or people getting supplies by boats. (R. 3261-3, Vol. 17.)

Louis M. Chaffin testified: I have been on the Colorado River from the mouth of the Green to Lees' Ferry, my first experience being in 1888 or 1889, at the California bar, to the shore opposite which point we hauled a 60 horse power boiler and other freight. (R. 3265-8, Vol. 17.) In 1892, I was again at the river with Ed Meskin, who was trapping; we built a boat 16 feet long and 3 feet wide at the mouth of Hanson Creek, put our supplies in the boat, and poled and rowed our boat up the river to Hite, also towing the boat. (R. 3268-70, Vol. 17.) Later I went down the river to Hole-in-the-Rock, encountering no obstacle that gave us any great trouble, although occasionally we would get on mud bars. Meskin knew the river well, and this trip was made in the winter. We went back up to Hanson Creek in February; a time or two it was necessary for us to get out into the water, but perhaps we could have poled the boats over those places. (R. 3271-2, Vol. 17.) In 1892 and 1893, there were people operating at Hall's Crossing, and Cass Hite had quite an outfit below Hite; there were also men at Tickaboo and Good Hope bars; probably 25 or 30 men there. In 1894, with two companions, I prospected along the river at various places, rowing and towing our boat on upstream trips. During that period we had a contract to deliver wood and timber to the California bar for Mitchell and Ryan, who were then working it; we would make rafts for this purpose and also load our boat. Supplies would come to Hite overland and we would take them down the river by boat. That year we were working about 35 or 40 miles below Hite. In going upstream, we would row, tow and pole; on one trip, when we had a larger boat

than usual, it was difficult to row upstream while the river was rising in May, but we had no difficulty coming downstream. (R. 3272-7, Vol. 17.)

After the high water goes down it leaves a channel if you can find it, and the channel will remain until a flood comes in from some side canyon and starts the silt moving, after which flood you have to hunt and find a place to go through; for that reason we get on the bars. Such change may come over night. (R. 3277-8, Vol. 17.)

In 1895, we operated on the New Year bar and Moquie bar, during that period boating our supplies from Hanson Creek. In 1896 or 1897, I bought the Shock bar, which we called the Independence bar, located ten miles below Hall's Crossing, boating our first supplies down from Hanson Creek, and later from Hall's Crossing. When the wind was in the right direction, we would sail our boats. I had ten men working for me at Shock bar. We boated our outfit down when the water was rising. I had seven boats and a raft, and one of two 24-foot boats was loaded with iron; in going over Bull Frog Rapid I had a boat sink but it was my own fault. "Other than that, it was the only trouble I had, and I consider that my own carelessness." (R. 3278-82, Vol. 17.) In May, when the water was high, I loaded sixty-odd sacks of oats on a big raft at Hall's Crossing and went down 15 miles below, intending to catch the raft, but when it arrived there were only sixteen sacks left. (R. 3283, Vol. 17.) In the fall of that year, I went downstream with another raft quite heavily loaded, and with the very low stage of water had quite a time at Lake Canyon, having to get in the water and pry the raft off the rocks. The depth at that ledge varied from nothing to over my head. By watching you could get a small row boat over the ledge if it wasn't too long and didn't draw more than a foot of water, but we had to pry our raft off at two or three places, and once unloaded it for maybe 100 yards. In 1894-5, there was some-

thing over a hundred prospectors along the river from Hite to Hall's Crossing and more than a hundred signers to our petition for a postoffice. (R. 3284-7, Vol. 17.)

In the fall of 1896 or 1897, Ed Meskin and I made a trip to Lees Ferry in a small row boat. Below the San Juan we encountered a lot of sand waves and at a lot of places had trouble finding our way through and would mistake the channel and get on bars; almost always we found a channel. We then turned around and came back up the river from Lees Ferry to Meskin bar, poling and working along, and later continued up the river to Moquie bar and the bars along Hall's Creek. We had no serious difficulties coming upstream except the work of towing and poling the boat. In the winter of 1898, I went from Hanson Creek to the Klondike bar, located below the San Juan River, with two big boats, each about 14 feet wide and 18 or 20 feet long; one of these boats was box shape and I put a nose on the other and fastened them together, tandem fashion. I loaded into the boats five four-horse loads of supplies and horse feed; also our scrapers and machinery at Moquie bar; thus loaded the boats drew about a foot of water. This trip was taken in January, 1898; an ice jam had formed so that at one point it had backed the river up for a mile and a half, and in going over Little Giant Rapid the rear boat, which was loaded the heaviest, must have had a hole broken in it for it sank. We saved part of the cargo and loaded it into other boats; we lost our scrapers and other machinery but replaced them with other scrapers and machinery and went on down to the Klondike bar, having trouble with sand bars on the journey. (R. 3287-95, Vol. 17.)

In 1899, we worked at the Stanton dredge. They had a barge which they used to handle their drill machinery up and down the river and also to move freight for about a mile and a half up the river. I never operated this barge myself with a

sail but have seen it sail upstream. Between 1899 and 1908, I placer mined in that section, moving my outfit upstream or downstream to the points desired, but, because of the hard work, took only what I had to have on my upstream trips. On the upstream trips we would have trouble at low water with bars. As a rule, the river would be at a low stage during the freezing period and generally in the latter part of February there would be mush ice running in the river, which condition would begin to end during that month, and the river would commence to rise in March. After the river raised a foot or so the effect of the bars didn't bother you and there was always room to get through if you knew where to find the places; after the spring rise commenced there was always a channel. It has been my experience on the river that after the spring rise, about the latter part of March, you could figure on going down the river if you found the right place to go and there was no place where you couldn't find the channel. Every rise or fall of the water would bring about a rearrangement of the sand bars but would not be accompanied by a change in the main channel or in the gravel bars, but the change would be in sand bars located in still water. (R. 3299-3306, Vol. 18.) "Where the river runs swift, and the gravel beds was, it took a lifetime to make much of a change." A flood during high water would make no noticeable difference. (R. 3308-9, Vol. 18.) I have waded the river at Shock bar and at a place somewhere below the San Juan River with a pair of hip boots without getting wet. (R. 3310-11, Vol. 18.) In 1917, I took a Star drilling machine and a Keystone rig, weighing probably more than five tons, from Tickaboo bar to Hanson Creek, a distance of 18 miles, on a raft and boat. (R. 3311-14, Vol. 18.) In 1904, I made a trip from Green River, Utah, to a point below Cataract Canyon in a 16-foot boat drawing eight inches, with A. G. Turner, who is now operating the California bar on the Colorado

River. Down to the San Rafael we had no trouble, and from there down to Cataract Canyon we had difficulty finding the channel. "Maybe we could have looked around and found a channel." Off and on we were hung up on sand bars; if we got in the wrong place and found we could not get through we backed up and found a place where we could get through. When we reached the junction we left one boat there and proceeded up the Colorado River to Moab in the other boat; "I don't remember having any trouble at all going up there. I don't remember ever getting up against anything that was any trouble." There was no place where we couldn't row and pole our boat right on up. (R. 3314-16, Vol. 18.) On the trip back down the Colorado from Moab to the mouth of the Green "I don't remember of anything occurring of any interest out of the ordinary." We had no serious trouble getting through Cataract Canyon although my partner's boat tipped over once. Generally we ran the rapids, but when the water was right bad we took no chances. (R. 3317-8, Vol. 18.) I have made no river trips of importance since 1917. While I was placer mining I would sometimes ship my gold out with the teamsters who brought freight to the river, but as a rule would bring it out myself. (R. 3320, Vol. 18.)

So far as shallow water and sand bars are concerned, the difficulties of navigation, as I observed them on the Green River, are very much greater than on the Colorado River between the foot of Cataract Canyon and the Utah-Arizona line; there are many more interruptions to downstream travel on the Green than on the Colorado below Cataract Canyon. I have never made an upstream journey on the Green River but I would say that it would require more power to go upstream on the Colorado River than on the Green River. Aside from the matter of power, I would say that the difficulties of navigating upstream on the Green River would

be greater than on the lower Colorado. (R. 3326-31, Vol. 18.)

I have probably used and operated fifty different boats on the Colorado River. It is generally true that any changes that occur in the channel of the Colorado River occur while the river is rising and settling during the high water season—I refer to the big changes. Where there is a gravel bottom the channel does not change much, but where there is silt it changes in low water; in high water you don't know where those places are; the small changes occur where the water is still. It has been my experience that after the water starts to rise there is a channel and after the water subsides the channel will remain pretty much as it was; your channel is then formed for the season, and unless some condition comes that changes the height of the water, your channel will remain pretty well as it was. (R. 3335-7, Vol. 18.)

Levi Kendrick testified: I took one row boat trip from Wolverton's Ranch to Three Canyons, four or five miles below on the Green River. I don't think we had any difficulties. The only boat I know of at Green River now is at Mr. Bedere's, six miles below town. I know Mr. Wolverton has taken supplies by boat to his ranch but otherwise don't know of merchandise being delivered by boat. (R. 3338-41, Vol. 18.)

Maude Kendrick testified: I once forded the Green River at Trap ford, about two miles north of Green River bridge, on horseback, in the summer of 1910, and have seen others ford at that place. The water came approximately to the stirrups when I crossed. I once went from the Wolverton Ranch to Three Forks Canyon in a row boat with Mr. Wolverton and his daughter and came back up in a motor boat. (R. 3343-9, Vol. 18.)

Elliott Bird testified: I am a surveyor with the U. S. Land Office and was with a survey party from

the Paria River to the Arizona line, and in making this survey we got clear over to the Colorado River; our supplies came over-land, as did our supplies when, in 1923, I was with a party surveying around Hall's Crossing; on the last mentioned survey I didn't get down to the water or off the high land. (R. 3370-1, Vol. 18.)

I was with the survey party from Moab to a point ten miles below Shafer Well No. 2—a government survey party; we then had our headquarters at No. 2 Well and obtained our supplies by boat and pack train. We used an 18-foot row boat equipped with an outboard motor in our survey operations; when our motor failed us and we were unable to row upstream, we would tow it up. I made an upstream trip on the Moab Garage barge and at several places we had trouble with sand bars, three times taking cables to shore. On one occasion we were hung up two hours and had to drag the boat upstream for about 150 feet. (R. 3373-8, Vol. 18.)

H. T. Yokey testified: I have built and operated so many boats on the Green River that I have forgotten how many I have operated, my first experience being in 1903 when I went 125 miles down the river to Cataract Canyon in a 15-foot row boat with a 3½-foot beam. On the upstream trip we rowed and towed. This was a hunting trip and I took similar trips for two or three years. I helped launch the City of Moab and when we got down to the confluence in that boat and up the Colorado as far as the Slide we were unable to make it up the Slide at the flood stage then existing in the river; we retraced our steps and tied the boat up at Halverson's ranch. On the upstream trip we hit a sand bar a few times but went on over them. The round trip consumed approximately ten days. At high water it takes a good craft to go up the Slide, whereas at ordinary water there is no difficulty at that point. (R. 3394-7, Vol. 18.) After this trip the owner decided to take

off the upper part of the boat, remove the tunnels, and to extend it 10 feet in length so as to make it a 61-foot boat and to put in steam power. After these alterations were made the boat was named the Cliff Dweller, and we went down to Valentine Bottom, 100 miles below Green River, Utah, having a very good downstream voyage. Our upstream trip coming back was better than the downstream trip. Once in a while we would run on a sand bar. On the return journey we went clear up to the town of Green River. In going over the riffles, because of the length of the boat, its bow would jerk around and the stern come up and lift the wheel out of the water, and a man would take a line ashore and get the boat off in 20 or 30 feet so the wheel would strike the water and we would go on. (R. 3398-3401, Vol. 18.)

After my trip in the Cliff Dweller, I built a boat called the Black Eagle that was 40 feet long with a 6-foot beam and a draft of 7 or 8 inches. It was equipped with a water tube boiler and a 20-horsepower engine. On a trip I made with that boat down to a point within 10 miles of Valentine Bottom, the water tube got full of mud and it blew up. I came back upstream with Mr. Wolverton on the Wilmont, taking the boiler and engine out of the Black Eagle, and later bringing them up to Green River, Utah. (R. 3411-13, Vol. 18.)

I was employed by John F. Richardson of the Reclamation Service to take some machinery down the river for use on the government survey, and took Mr. Richardson down to the head of the Cataracts in a 14-foot boat having a 6-horsepower engine. I built a barge 32 feet long by 8 feet wide, put 500 or 1000 pounds of supplies in the barge at Green River bridge, and went down the river. I got another launch that I had used at Halverson's ranch, ten miles below; at that point we loaded the barge with more supplies that had come there overland. I had no difficulty going down to Wimmer's ranch. After I had finished loading the barge at Halverson's

ranch, we lashed it to my launch and took it down to the mouth of the Green River. (R. 3415-8, Vol. 18.)

After we made the round trip to Valentine Bottom with the Cliff Dweller, its owner, Mr. Lumsden, told Mr. Anderson and me that we could go ahead and operate the boat during the season at our own expense; Anderson and I started in in good faith to do this, but when Lumsden made the sale of the boat we released him from his agreement. We thought some changes should be made in the boat and we were going to be allowed to keep all we could make out of it during the next season. When we started down the river with the Cliff Dweller we had seven tons of coal on board and I am sure that it then drew about 20 inches. (R. 3419-21, Vol. 18.)

I have lost track of the number of times I have been down to the mouth of the Green River in boats; some years since 1903 I have made from three to five trips and other years not more than once or twice. If a party came along I was always ready to take them down. (R. 3423, Vol. 18.)

Some years there are spots between Green River, Utah, and the mouth of the Green where at low water you couldn't find a channel for a 24-foot boat drawing a foot of water, because at those points the river might be split up into two or more channels; if you had all the water in one channel you would have sufficient water there. I don't know how much water the Wilmont drew. Wolverton did most of his running up and down the canyon with that boat, and he would know more than I would as to whether there is any stage of water when that boat could not go up and down the Green River, and I wouldn't care to express an opinion as to whether the Wilmont would experience trouble at any stage of water between the mouth of the San Rafael and the mouth of the Green. (R. 3424-5, Vol. 18.) Three years ago I was unable to get my boat that didn't draw over a foot of water up the river at Little Valley; there is no other instance when I couldn't get up and down the river

with a boat having a draft of one foot, and theretofore I "always came back to the home port," and had always before that been able to find a channel sufficient to permit a boat drawing a foot of water to travel through. As a general thing, even at the shallow places that I have described, there is no difficulty in finding a deeper channel, but sometimes it is pretty hard to find; you are always able to reach your destination. When the river rises if you go through and agitate the sand it cuts a channel. When you come over that same route a day or two or three days later, it is my experience the channel is enlarged and the current will go into one channel instead of spreading out into two or more." (R. 3426-31, Vol. 18.) If I go downstream when the river is falling and make a channel, in making a trip after that I have no hesitation about coming back; I know where I am all the time and come right on through. I have done it and can do it again. Right today, if I knew that a boat hadn't been down the Green River this year and if somebody wanted me to take two thousand pounds of supplies down the river I would tackle the job if there was compensation enough, and I would reach my destination in the course of time; and after that trip if some one else should come along and wanted me to repeat it I wouldn't have nearly as much hesitation about taking on that job. I would feel that after the first trip had been taken the later trip would be easier. (R. 3441-4, Vol. 18.)

The barge that we built carried a load estimated at ten tons down to the junction of the two rivers where we cached it for the government party. (R. 3448, Vol. 18.)

I now have a 22-foot boat made of 14-gauge iron and wire; it has a beam of 5 feet, an 18-inch propeller and the skag below is over 10 inches; it draws too much water and I am figuring on putting on a stern wheel and intend to put this boat in the Green River and operate it there, and I expect to go down to the junction and thence up to Moab in that boat. (R. 3448-9, Vol. 18.)

Walter E. Mendenhall testified: I am seventy years old and spent most of my later life in the neighborhood of the San Juan and Colorado rivers.

In 1894 my party came down the San Juan River with four boats loaded with our outfit and supplies and we picked up a fifth boat on our way down. (R. 3463-70, Vol. 19.) Upon reaching the mouth of the San Juan we swung into the Colorado and went thence up that stream to a point just below the Hole-in-the-Rock, rowing and towing to suit our convenience on the upstream journey. (R. 3472-5, Vol. 19.)

We went to the California bar and remained in that vicinity until March or April, 1895. There were probably fifteen or twenty other men then at that bar. In the spring of 1895, three of us took three boats and started down the Colorado on a general prospecting and exploring trip and continued on down to Lees Ferry. At that time there were men working at the Tickaboo and Good Hope bars, also at Red Canyon. On our trip to Lees Ferry we contended against "some of the river elements, winds, and some not large rapids, good deal swift water, but we didn't call them rapids." I don't remember encountering any sand bars. "Of course, there were sand bars, but none that interfered with us except perhaps in landing we would find some sand near the shore; didn't bother us." (R. 3480-3, Vol. 19.)

In 1895, when on our way to Lees Ferry, one of our boats was loosened by the wind; it had in it all our supplies and equipment and it floated off downstream; next morning about a half mile downstream we found it stranded on a sand bar with no damage done and our entire cargo perfectly secure. (R. 3486-9, Vol. 19.)

In 1907 we started on a boat trip from Richardson Valley, located 10 or 15 miles above the Cisco pumping plant, with one 14-foot boat and an old 14 or 15-foot scow, and went down the Colorado River to Moab. Right at the mouth of Castle Creek there is a rapid and also at the mouth of Salt Wash the water is

fairly rough, but not bad. From Moab we continued on down to Cataract Canyon, prospecting as we went. We didn't intend to go through Cataract Canyon but did continue on down to the eleventh rapid. There we noted an inscription:

> "F. H. Wright passed here in 1876; lost one boat in this rapid."

Later I met Wright, who was a miner and prospector, and he told me something of his trip. At the eleventh rapid we loaded all of our outfit into the boat, left the scow there and went back up the river with our boat and outfit to Moab, rowing when we could and towing when there was a sand bar or place along which we could walk; we also poled some. On this upstream trip we continued to prospect and occupied about two weeks in going back up to Moab. (R. 3490-6, Vol. 19.)

In 1916 my partners and I decided to go down to Hite, build a boat and go down to the mouth of the San Juan River, and thence up that river to some country we wished to prospect. We went to Hite and built the boat and went down the Colorado River to the Narrows, where we remained six weeks or so. We encountered an ice gorge on the Colorado and decided to try to reach the San Juan, which was open and clear, by going overland; however, we couldn't get across and gave up our plan. (R. 3496-7, Vol. 19.) By the time we got back to our camp on the Colorado the ice gorge had gone out but we didn't have much food left and decided to go back up the river. (R. 3498, Vol. 19.)

In 1916 my partner and I built a boat at Green River and started down the Green River in February while the ice was flowing in the river. We encountered some sand bars but nothing of any consequence; "they didn't bother us any." A short distance below Green River, Utah, the cake ice lodged in the riffles, which bothered us a little. Upon ar-

riving at the junction of the Green and Colorado, we went up the Colorado to Moab, having the usual upstream trip, which was rather hard and tedious; it was pretty much heavy rowing. That year the ice was frozen in the canyons above the junction of the rivers until sometime the latter part of February; it freezes in those canyons during all severe winters. (R. 3500-4, Vol. 19.)

From 1922 to 1924 I was on the Colorado River working placer ground both above and below Moab and went up and down the river in boats while thus engaged; that is the only way you can go, practically. The boating to which I have just referred extended from about 3½ miles above Moab bridge to a point twenty-two or three miles below the bridge. (R. 3513-4, Vol. 19.)

When we came down the Colorado River in August or September, 1907, past Castle Creek and on to Moab, we had no trouble getting through the rapid water existing at the two points I mentioned, and I would say that you could take a reasonable load of supplies down that stretch of river between Castle Creek and Moab and there wouldn't be any difficulty in arriving down there if you always kept in the current. (R. 3521-3, Vol. 19.)

In all my years of experience on these rivers, I have never lost a boat, and the only serious mishap I have ever had is the occasion I have referred to, when my boat carrying my supplies and equipment was loosened by the wind and drifted downstream onto a sand bar, where next day we recovered it with no damage done. (R. 3528, Vol. 19.)

Homer J. Hite testified: I went to Hite in 1888. Found a log cabin and half a dozen men there engaged in placer mining. We freighted a boiler and two vacuum pumps to Hite, there loaded them on a scow 20 feet long and 10 feet wide, drawing 5 or 6 inches, and boated them 18 miles down the river to Tickaboo bar in April or May, 1889. I didn't make

that river trip. Before then I had been down in the vicinity of Good Hope and Tickaboo in a row boat. There are a number of rapids on that stretch of river. Coming back upstream with the row boat, we towed most of the way, and at the rapids had to get out and pull the boat up. (R. 3560-7, Vol. 20.) A postoffice was established at Hite in 1889 and I was postmaster. There were about 20 or 25 people, who got their mail there, living in an area containing fifty square miles. There were two trappers down the canyon every winter who got mail at Hite. Six or eight men were working at North Wash. I was down there nearly eight years. (R. 3568-70, Vol. 20.) During that eight years I went down the river as far as Aztec Rapids; that trip was in 1894. I think the highest rise we had on the river was 21 or 22 feet. Rises in the river were occasioned by the melting snow and by freshets, cloudbursts, etc. Spring high water from melting snows begins in April and ends early in July. (R. 3572-3, Vol. 20.) During July and August the stage of water is more variable than at any other period. Any obstruction in the river would create a change. In September and October the water was usually stationary and low until spring except when a rise might be caused by a rain. In February and March the water would usually rise again. High water and also extreme low water and cold weather would stop our operations sometimes for a week and sometimes for two months. There were no power boats during my time there; the miners used small flat bottom home-made boats in which to go up and down the river. My party worked principally on bars between Tickaboo and Good Hope and always above high water mark; we never worked on the river bed itself, and water never flooded the top of the Tickaboo or Good Hope bars while I was there. I only recall the Stanton, Brown and Best parties coming down the river in boats from Green River, Utah. (R. 3574-8, Vol. 20.)

The trappers I spoke of trapped beaver and otter principally. At times I saw them with their skins, which they would bring up to Hite in their boats and there prepare the hides in the spring. This continued during the eight years I was there. In coming upstream with my boat I towed part of the way and occasionally used a bed blanket for a sail. On two occasions I saw other men using a sail. (R. 3579-81, Vol. 20.) In building the scow I mentioned, I used 2-inch lumber on the bottom and inch lumber on the sides, the bends being 2x6's. There was a 10,000-pound steam boiler and two pumps, weighing 1,000 pounds each, which I loaded on to this scow, in addition to some supplies and a crew of six men. (R. 3582-3, Vol. 20.)

On one occasion I made a trip from Green River, Utah, down to a point 40 or 50 miles above the mouth of the Green River. I had a flat boat similar to the one I used on the lower Colorado for taking machinery downstream, although not so large. This Green River trip was made late in August, and we went down to Valentine Bottom, taking two milk cows on the boat. We had to unload them at the Green River bridge, before we could get across the bar there, and again loaded them on the boat at Wheeler's Ranch. Just below Wheeler's Ranch we again got stuck and unloaded the cows and proceeded on downstream, occasionally getting on a bar. I don't recall seeing anything but row boats on the Green River except the ferry boat. (R. 3587-91, Vol. 20.) On the Green River trip Mr. Valentine, his son, three daughters, and two granddaughters, aged about seven and twelve years, accompanied us. The women and children went down in row boats and we carried the household goods, equipment and supplies of the family on the big boat. (R. 3600-2, Vol. 20.)

John P. Hite testified: I went down to Hite in 1888 with my brother, Homer J. Hite, and when he left I succeeded him as postmaster there. (R. 3605-7, Vol.

20.) I made two downstream trips from the Dirty Devil to Lees Ferry and one upstream trip. My first trip was with Stanton, when six of us went down with three row boats. We located the river bed from the Dirty Devil to Lees Ferry. There were a number of rapids on that stretch of river, including a very shallow rapid at Smiths Fork, where we had to drag our boat a ways. The trip was made in the winter time when the river was very low. There is a rapid at the mouth of each side stream. (R. 3608-12, Vol. 20.) The boats we used were keel boats, and we brought them back up with us and also brought a big launch upstream. Mr. Stanton had expected to bring this launch up on its own power but it was helpless and we were 26 days getting it up to the dredge. The engine in the launch would run but it didn't do good work. Coming up we would row, taking advantage of the eddies at the side of the river, but we had to tow at all of the rapids and were an entire day getting the big launch up over Aztec Rapids. (R. 3612-4, Vol. 20.) My nephew correctly described the scow or barge that we built for moving our equipment, and they didn't have any trouble getting down the stream. In taking supplies down to Tickaboo we would occasionally use pack animals if a boat was not handy; but most of the time we used boats. (R. 3614-7, Vol. 20.) I never did any work on the dredge but did quite a bit of boating for Mr. Stanton. I used ordinary row boats that were shipped in from San Francisco, and we operated those boats over the whole river between Hite and Lees Ferry except that in coming upstream we had to drag them over the rapids. On the return trip from Lees Ferry we took three of the Stanton boats clear up to Hite and there obtained two loads of material. (R. 3620-3, Vol. 20.) I made a number of trips between Hanson Creek and camp with those keel boats and had no difficulty in getting them upstream; it was comparatively dead water and we almost had to row going downstream. Between North Wash and Hanson

Creek there were rapids but that stretch was tolerably free from sand bars because there is more swift water there than in other places in Glenn Canyon. I observed that different stages of the water caused a rearrangement of the sand bars and after high water or floods down side canyons there would be a change in the channel of the river. I wouldn't say that the changing was daily, weekly or monthly. The sand is working continually. I have seen sand waves there. (R. 3624-7, Vol. 20.) I went to Hite in 1905, farmed there until September, 1914, getting our water from Trachyte Creek. We had difficulty with the ice once. I have seen a lot of ice floating down in the winter time and when it gets into a small place and freezes it sometimes gives difficulty. Almost every year there will be ice gorges. (R. 3628-9, Vol. 20.) I have ridden horses across the river at Dandy Crossing in winter but never at any other time. (R. 3632, Vol. 20.)

They spent four days working on the engine of Mr. Stanton's launch at Lees Ferry but they didn't get it running; that is, it would run, but not in the water, and after we got started on the trip it didn't run at all. (R. 3633-4, Vol. 20.)

There was a placer boom on the San Juan River and those placer miners came on down to the Colorado River. I remember one or two parties came up the Colorado as far as Hite in small boats. (R. 3635, Vol. 20.) I made one boat trip down to Lees Ferry with a man named Turner right after high water in 1909 or 1910, who was a prospector and a "river rat," and we had a very good boat that Mr. Stone had left at our place. In 1905 I made a boat trip to Lees Ferry with a man by the name of Wyschuhn, for the purpose of relocating some claims. I think we could have made the trip in three days if we had kept going; we had no accidents but we stopped to make locations. (R. 3639-43, Vol. 20.) After Turner and I reached Lees Ferry, Turner took his boat back up the river and I later saw him at Hite with that boat. (R. 3646-7, Vol. 20.)

Lester A. Shaw testified: In 1914 I was employed as boatman by the U. S. Reclamation Service with the Richardson party on a salary and I also furnished boats. I had a 14 or 16-foot motor boat called "Belle of Shannon," which drew 6 or 8 inches of water empty. I launched the boat at Green River, Utah, went down to Wimmer's Ranch where freight and equipment had been loaded on a barge, and continued thence down the river with the party between Green River, Utah, and Wimmer's Ranch. Particularly as I was alone and knew nothing of the river, I frequently got into the wrong channel and would have to get out and push, and my boat occasionally scraped. At Wimmer's Ranch two of the party, with their personal equipment, got on my boat and we continued down to the mouth of the Green River, and continually had experience with sand bars. I would get stuck with my boat and I think that on occasions I got out and helped with the larger boat which, as I remember, did get stuck occasionally in going through the lower places in the river when there might be one or two channels and we might get into the wrong one and have to go back and get into the other one. I would say that I got stuck two or three times a day. (R. 3652-8, Vol. 20.)

While drilling operations were in progress I believe I made one boat trip up the Green River and two up the Colorado to Moab. As I remember it, the difficulties on the Colorado River were similar or possibly worse than those on the Green. (R. 3658, Vol. 20.) I made an upstream trip when we took the drilling equipment out; there had been high water and the sand bars had changed their position; however, it was easy to work backwards off the bars and get to the channel going upstream but there were places where we had to get out and pull and push. (R. 3662, Vol. 20.) Exhibit 477 is a photograph taken at the junction as we started out. (R. 3672, Vol. 20.)

John F. Richardson testified: I am a civil engi-

neer in the War Department and had charge of the 1914 government party which was investigating the matter of a reservoir site at the junction of the Green and Colorado rivers. (R. 3675-7, Vol. 20.) The latter part of June, 1914, I made my first trip down from Green River, Utah, in Captain Yokey's motor boat. (R. 3678-9, Vol. 20.) I had with me a government map dated in 1910 (Exhibit 480) which is a part of the report of Lieutenant Leeds. (R. 3680; 3713-5, Vol. 20) and consulted survey made by Lieutenant Leeds as I went down the river; I found no riffles that did not appear on the maps I had with me, which pretty well covered the situation. (R. 3685, Vol. 20.) On that trip we went to a point a few miles below the junction, in a day and a half or two days, and came back up in four or five days; and it seems to me that we encountered quite a few sand bars coming upstream. (R. 3688-9, Vol. 20.) During that summer I made a trip from Moab down the Colorado to the junction in a motor boat having a draft or about 15 inches, and I made the upstream trip to Moab a number of times. That stretch of the Colorado was essentially like the Green River; the current was a little swifter and carried more suspended matter; we went up the Slide under power; it seems to me that we encountered sand bars going up and down that stretch of the Colorado but I will not be perfectly sure about it. (R. 3695-6, Vol. 20.)

In the fall of 1915 I made a boat trip from Hite to Lees Ferry with Mr. Wimmer looking for reservoir and dam sites; we encountered riffles at the mouth of the San Juan and there was so much mud in the river that it stopped our boat from leaking. (R. 3696-8, Vol. 20.)

William R. Chenoeweth testified: I am a topographic engineer employed by the Department of the Interior. In 1921 I was on the profile survey from the mouth of the Green to the mouth of the San Juan. We had different kinds of boats at different

times. Leaving Green River, Utah, on September 12, 1921, we had four 18-foot boats with a 3½-foot beam and an 18-inch draft, one boat having an outboard motor. We reached the mouth of the Green on September 15th. There were rapids between Green River, Utah, and the mouth of the San Rafael, but I recall no difficulty in getting our boats through, and recall no difficulty in Labyrinth or Stillwater Canyons, and don't recall encountering any sand bars. We commenced our survey at the mouth of the Green. On Sheet 13 of Exhibit 10 I have indicated rapids encountered, and islands. We continued this survey on down through Cataract Canyon. (R. 3884-91, Vol. 21.)

Before the trip I have mentioned, to wit, in July and August, 1921, we went overland to the Colorado River at the mouth of the Dirty Devil, and continued down to Hall's Crossing, where I left the river and went overland to Green River, Utah, to get an outfit for the trip and survey mentioned above. After getting through Cataract Canyon that we surveyed I passed on down the Colorado River to the mouth of the San Juan and helped Mr. Fowler in the survey at Navajo Creek, and observed that a rapid I had seen on my first visit there at the mouth of North Wash, which as I remember then had about a 5-foot fall, had distributed downstream and I don't suppose there was any perceptible fall. At the mouth of the San Juan I met an old man with a large, clumsy row boat coming downstream, and he said he had come down from Grand Junction, Colorado. (R. 3891-7, Vol. 21.)

John Bernard Reeside, Jr., testified: I am a geologist employed by the U. S. G. S., and between August 4th and August 10th, 1926, made a boat trip from Moab to the mouth of the Green River in a 16-foot boat having an outboard motor. The purpose of this trip was to make a reconnaissance along the river banks. We left Moab at 10:30 a. m. on August 4,

1926, and we had traveled downstream 34½ miles, our boat grounding at a number of places, our worst grounding being at a place a few miles above Kane Creek, where we took the outside curve of the river, which ordinarily would be the deepest part, and were compelled to push and pull our boat for about a hundred yards to get into sufficiently deep water. On August 5th we continued on down to the junction, 30½ miles below, making no stops that I recall, although there were a number of places where I had to get out and wade to find a sufficiently deep channel. From the junction we went up the Green River three miles and had such difficulty in finding a channel that we turned around and came back, went up through the Slide on the Colorado, and camped for the night. We remained at the Slide on August 6th, and next day continued up the river, having difficulty in getting through rocky places at the mouth of Salt Wash. (R. 3921-7, Vol. 21.) We couldn't determine the age of the Slide; it might be a hundred or a thousand years old. The day we left the Slide we camped at Mile 22 and grounded a few times, making the twenty miles in nine hours. On the remainder of the journey up to Moab we frequently grounded, and at places I waded to find a channel, our worst experience being just below the dock at Moab where there had been a flood down Court House Wash which carried rocks, mud and logs into the river. (R. 3927-35, Vo. 21.)

I would say that the difficulties encountered in navigating that stretch of the Colorado between Moab and the mouth of the Green are about the same on the upper half as on the lower half of that stretch. (R. 3948, Vol. 22.)

Ray Bonner Worthy testified: I am an engineer and was in the government surveys on the trip referred to by the witness Sawyer between July 10th to late August, 1914, that trip covering the stretch between Green River, Utah, and the mouth of the Green. In making the survey over the section we

crossed the river back and forth after leaving the mouth of the San Rafael and observed sand bars; sometimes there would be two or three channels going through a bar, and our problem would be to pick the proper channel. We would travel along the shore line pretty close, work from side to side of the river and make very frequent landings. (R. 3956, Vol. 22.)

Alvah T. Fowler testified: I am a topographic engineer with the U. S. G. S., and was on the 1921 survey from Lees Ferry up to about Mile 51, having nine men in my party most of the time. I started upstream from Lees Ferry on July 4th with a row boat operated by Jerry Johnson and equipped with an Evinrude motor. We didn't move our camp from Lees Ferry until a large motor boat arrived there and then moved upstream eleven miles, using our small boat for that purpose, the Evinrude motor in which got out of order and broke down entirely. We were at different camps above Lees Ferry and our supplies were brought up the river to us from Lees Ferry in a boat operated by Mr. Marrs. On one occasion I saw his boat stuck and the crew were wading around trying to find a channel. While there I saw only one old prospector in a boat aside from the government parties. A rise in the river occasioned by rains would cause changes in the channel within 24 to 48 hours; I remember noticing this at Mile 41. (R. 3957-69, Vol. 22.) My survey extended back from the river about ten miles and it was necessary for me to have pack trains and I brought supplies with my pack outfit when our survey work was proceeding back from the river. (R. 3980, Vol. 22.)

Raymond C. Seitz testified: I am a topographic engineer with the U. S. G. S. (R. 3982, Vol. 22.) In October and November, 1912, I was with a party that made a survey from Moab on the Colorado River down to the mouth of the Green River. Below Moab

we used a large flat-bottom boat 10 feet wide and 30 feet long for two days, and we also had two row boats. We found the big boat on the beach near Moab bridge and used it for a houseboat until it sprung a leak and sank, and then had delivered to us an 11-foot boat with a 5-foot beam and a 10-inch draft, which was put in the river at Moab and brought down to where we were working. (R. 4017-25, Vol. 22.)

On the stretch of river between Moab and the mouth of the Green, I made no observations with reference to the channel or sand bars or anything of that character "other than when we were pulling in shore and leaving shore." We took all of our supplies with us from Moab. (R. 4022, Vol. 22.)

Herman Stabler testified: I am chief of the Conservation Branch of the Geological Survey. (R. 4036, Vol. 22.) I have crossed the San Juan, Green and Colorado rivers at different places and I have made a boat trip from Hall's Crossing to Lees Ferry. (R. 4041, Vol. 22.) On this boat trip, made in early September, 1922, I think that we stuck several times; I think every time we were on the river. (R. 4054, Vol. 22.) At one place only, bed rock extended clear across the river and our boat scraped in the best channel that we could find where the water must have been less than a foot deep for a distance of 50 feet or more. (R. 4055, Vol. 22.) We would often run into sand bars unawares and once were stuck for several hours. We were traveling down the river at a little too great a speed and went pretty well up on the bar. In a silty river like this there is a tendency for a bar to form in the middle of the stream with a channel on either side and it is quite hard when coming downstream with the muddy water to tell which channel to take. We had four open row boats 18 feet long, with a 4-foot beam and a draft of 6 to 8 inches. (R. 4059-60, Vol. 22.)

Selden Spencer Nye testified. I am with the U. S. G. S. and on September 26, 1926, with another man

made a boat trip from Green River, Utah, to the mouth of the Green in a 16-foot boat having an Evinrude motor, our purpose being to map the geology of the canyon. In the first 21 miles we had a great deal of difficulty because of the rapids and at the mouth of the San Rafael were compelled to wade and drag the boat over gravel because it was so difficult to find a continuous channel at that point. Thence down to the mouth of the Green there was only one riffle, which wasn't bad, but we had trouble avoiding sand bars and we were in the water a good deal searching for a continuous channel. From the mouth of the Green up to Moab, because of a rain, the water was deeper and we just had enough power to make it up through the Slide. We did not encounter any sand bars until we got upstream 15 or 20 miles above the junction and we had the most trouble at a point a mile below the Moab bridge. Our boat drew about a foot and a half of water. (R. 4181-6, Vol. 24.)

Neither I nor my companion had ever been on the rivers before and had no knowledge as to the location of channels. We quite frequently went ashore. We could not see where the channel was every time and were quite often fooled as to its position. Where we had trouble at the mouth of the San Rafael the stream had divided and we started down a channel that became shallow and were confronted with the alternative of going back up the channel we had come down or dragging the boat across the bar into deeper water. (R. 4188-91, Vol. 24.)

Joseph A. Ross testified: My first trip on the Green River was in 1889. There were six of us in three row boats and we went about 50 miles below Green River, Utah, on a hunting trip. Down to the mouth of the San Rafael we had difficulty with gravel bars; sometimes we could push off with our oars and at other times we would get out in the water and push. This trip was at low stage of water, in September. We rowed and towed our boats back up to

Green River. (R. 4196-8, Vol. 24.) In July, 1893, I made another trip in a 16-foot scow with a load of 500 pounds, the boat drawing five or six inches. We went down to a point 8 or 10 miles above Valentine Bottom to do some prospecting; had a better boat down there and rowed and towed upstream on the return journey with that boat. (R. 4199-4201, Vol. 24.) In September, 1893, I went down to Valentine Bottom to bring the Valentine family who were living there up to Green River, Utah. I had a boat 16 feet long and possibly 4 feet wide that I got from a trapper who had left the boat at Green River, Utah. Going down we had pretty good sailing, now and then hitting a bar as you always will. On the upstream trip we brought Mr. and Mrs. Valentine, their daughter, who is now my wife, and my sister. The upstream trip was at a low stage of water in the autumn, and I think we took seven days coming up to Wimmer's Ranch, rowing and towing. At that point the passengers got out and went overland to Green River and I continued on up with the boat to Green River, Utah. The Valentine family lived down at Valentine Bottom for a year and their son would at times come up with a boat and take supplies down to them in a boat; these trips for supplies were made throughout the year. I don't recall that Valentine ever got supplies overland. (R. 4202-5, Vol. 24.) Again in November, 1893, I took the owner of a mining prospect down to his property and back up to Green River, Utah. Between Green River, Utah, and the mouth of the San Rafael, we possibly grounded a time or two and below there we would find too shallow water and be compelled to help the boat off. On the upstream trip we had to come through much ice that was running on the river which made it especially difficult. (R. 4205-6, Vol. 24.) Between 1893 and 1905 I made other hunting trips, with similiar experiences to those I have described.

In July, 1901, I made a trip in a row boat when the water was very low from Green River to the head of

Cataract Canyon with a surveying party that intended to build a sanitarium at Cataract Bottoms, with similiar experiences to those I have already described. (R. 4208-9, Vol. 24.)

I was engineer on the Undine on its first river trip. We had a crew of seven or eight or more men, and on the downstream trip struck sand bars, some days being hung up for several hours and other days making good headway. I believe the boat had a 22 horse power engine. On the trip from the head of Cataract Canyon up to Moab the bars didn't give us much trouble because we would strike them at the lower side. (R. 4210-6, Vol. 24.) I was one of the pilots on the first trip of the City of Moab when we went down to the junction and three miles up the Colorado. That boat was too awkard, too heavy and had too much draft. I think its draft was about two feet. Between Green River and the mouth of the San Rafael we grounded three or four times but not badly and encountered sand bars in Labyrinth and Stillwater Canyons. We were possibly six or seven days coming back upstream and, because of shallow water stopped at Halverson's Ranch and remodeled the boat, making it into a steam boat and calling it the Cliff Dweller. We then went in the Cliff Dweller from Halverson's Ranch up to Green River, Utah. We had a little trouble, but that trouble should have been avoided. (R. 4218-23, Vol. 24.) I went down to Valentine Bottom on the Black Eagle, made a trip with Mr. Oppenheimer in the Paddy Ross, a 27-foot boat with a 6½-foot beam and equipped with a 14 horse power engine; there were four men on the boat. One man had his sister who was going down to his mining claim with him to spend the winter. We took their winter supplies on the boat with us. My wife accompanied me. We struck sand bars and worked our way through. I have also been on boat trips in the Wilmont, a boat 26 or 27 feet long with a 6-foot beam and equipped with a 4 horse power gas engine. We had to help the Wilmont over the riffles.

(R. 4223-8, Vol. 24.) I have also made trips in the Marguerite. Sometimes I can pick the deep water with accuracy; other times it is impossible. At certain stages of water a man accustomed to the river can locate a sand bar even though it is as much as a foot under water; there is always a little break in the water surface that one not experienced wouldn't notice. I have seen the channel change on the Green River and have seen it change from day to day. I have observed it while the change was in progress at times when the water is dropping to its lowest level, when the top of a high sand bar is exposed and the water is receding; even then one may get into a pocket. There are places where there are several channels and you can not pick the deepest channel with certainty. (R. 4230-5, Vol. 24.)

I have taken dozens and dozens of river trips in smaller boats besides those I have mentioned in my testimony, and possibly some other trips in small power boats. All but two of my trips in the larger boats have been for compensation; not so many of the trips in smaller boats were for compensation, most of them being for pleasure. In about 1893, I took some supplies down to people who were for several years engaged in mining operations on the east side of Green River. (R. 4235-8, Vol. 24.) I am a carpenter and have built a good many row boats and have helped with the construction of larger motor boats; these boats were built for other people and were used on the Green River. (R. 4241, Vol. 24.) The more experience you have on either the Green or Colorado rivers and the better and more recent knowledge you have of them the more readily you will be able to navigate and the fewer difficulties will be encountered by you. (R. 4246, Vol. 24.)

Where the river is of average width through a section where the stream is confined, you don't have any trouble with boats of the drafts I have seen used; channel difficulty is encountered where the stream is not confined and breaks up and becomes braided. At

such places, if a man is not familiar with the stream or hasn't been going up or down it recently so as to know just which ribbon of the stream to take, he may get fooled and take the wrong channel going downstream; coming upstream he is in better position to select the right channel. (R. 4255-6, Vol. 24.) There is not always a channel. (R. 4258, Vol. 24.)

I haven't been on any river trip where I didn't succeed in reaching the place I started for except the one trip I have mentioned with the City of Moab, and on my own boats and on the boats of any party with which I have gone and on all power boat trips the only time in my experience when I did not reach my destination was that trip on the City of Moab. (R. 4260-1, Vol. 24.) It was usually in August or September when we found the braided channel condition. (R. 4262, Vol. 24.) When the wind is blowing you can easily find the deep water by observing the waves. (R. 4267, Vol. 24.)

Ella Ross testified: In September, 1892, we went from Green River, Utah, to Valentine Bottom with two row boats and a scow and remained there for one year. On the downstream trip we encountered sand bars many times, I couldn't say how many. My brother used to come up to Wheeler's Ranch in a light row boat and bring our supplies to us at Valentine Bottom in his boat; he made very few boat trips from the Wheeler Ranch to Green River, Utah. In 1894 I went from Wimmer's Ranch to a point below Valentine Bottom, known as Turks Point, and my recollection as to experiences with sand bars is similiar to that testified to by my husband, Joseph A. Ross. (R. 4271-6, Vol. 24.)

On my trip in the Paddy Ross I piloted the boat part of the distance downstream, I should judge for about 30 miles. I had never before piloted a boat on that river and had never before in my life piloted a motor boat. (R. 4276-7, Vol. 24.)

Chris Halverson testified: In 1889 or 1890 I helped operate a ferry boat at Green River, Utah, and thus helped during the high stage of water for three or four years. I wasn't taking any interest in river traffic but don't know of any merchandise being received by Green River merchants via the river. I have taken cattle across the river in the stretch from below the mouth of the San Rafael up to Book Cliffs. In high water they would swim and I have crossed along there on the riffles without swimming them. The cattle seemed to understand the riffles and would follow the course where the water was shallow; we guided them to a certain extent so they would not get off the riffle into deep water. (R. 4285-90, Vol. 25.)

We now invite attention to testimony of witnesses produced on behalf of defendant:

WITNESSES FOR DEFENDANT.

K. D. Williams testified: Between May and December, 1926, I was with the government survey party on that stretch of the Colorado River between a point about one mile below Moab and Lockhart. We used the same row boat we had used on the San Juan, also 15-foot outboard motor boats and Moab Garage Company motor boats. Charles F. Moore was chief of that party. In meandering the stream it was necessary to go to shore at almost every bend in the river. (R. 4340-2, Vol. 25.) I was again on the Colorado River with the same survey party from May until December, 1927, when our work was between a point a mile and a half below Moab and a point six miles below the mouth of Indian Creek. We would usually be on the river a part of every day. I made a number of trips from Lockhart to Moab in 1926, and in 1927 made ten or fifteen trips between Moab and Lockhart, on three or four of which trips I drove the boat. On one occasion I saw a large boat of the Moab Garage

Company stuck on a sand bar for about four hours, and I saw it stuck on eight or ten other occasions for periods ranging from five to fifteen minutes or half an hour. With the small motor boats I was never held up more than a minute or so and did not have to get out and push my boat off, nor have I seen such an incident when other people were operating the small motor boats. (R. 4343-6, Vol. 25.) In addition to our own boats and those of the Moab Garage Company, there were five or six boats plying the river while I was with the survey party on that stream. (R. 4346-7, Vol. 25.)

The smaller boats I operated and saw operated on the Colorado River were not stuck on sand bars; they would be stopped but not stuck so as to get in trouble in getting off. On two of my trips I wasn't stopped at all on a sand bar and on the other trips I was merely stopped as a result of getting out of the channel. I noticed no changes in the channel of the Colorado River. (R. 4355-8, Vol. 25.)

William Hyde testified: Seven or eight years ago another man and I left Moab in November with two row boats on a trapping expedition and continued down the river into Cataract Canyon as far down as the fourth or fifth rapid. We trapped there for a little over a month, and then brought our boats back up through the cataracts and to Moab in February. On this trip we took all of our supplies and camp outfit with us from Moab. On the return journey we took our furs with us in our boats and shipped part of them to Denver and part to Grand Junction. Our furs included wild cat, fox, coyotes and beaver. In coming back up through Cataract Canyon it was difficult, and we towed. (R. 4434-8, Vol. 25.) On that trapping expedition I passed another trapper from Colorado in a row boat; I also passed Mr. Turner, who was trapping. I had very little trouble with sand bars; I have run on to them when I wasn't

watching where I was going, but never got into trouble if I was paying attention. (R. 4439-40, Vol. 25.)

The following year I left Green River, Utah, about October 1st with another man. We had two boats and trapped for beaver along the Green River to the junction, and thence went up the Colorado River to Moab, arriving there in February. We carried our beaver skins in our boats with us and shipped them from Moab to Salt Lake City. The year before the Colorado River didn't freeze, although we had a little mush ice running on our way out, but the next year the Green River froze for about thirty days, it being an exceptionally cold winter. However, the Colorado did not freeze that winter, there being only a little mush ice in the stream. During the time the Green River was frozen the ice was from one to two inches thick—not thick enough for me to slide my boat over. Ice was the only difficulty encountered on this expedition. (R. 4441-5, Vol. 25.)

On my second trapping expedition I didn't find the channel in the Colorado River exactly the same as it was the year before; it changes. Anyone will accidently run against a sand bar at times; I did so, but had no trouble. On my first expedition I wasn't hung up on a sand bar more than two or three times on the round trip. I rowed my boat upstream most of the way, although at lots of places I towed it. (R. 4446-7, Vol. 25.) In coming down the Green River we had no trouble at any of the rapids and did not ground at any place. I don't recall getting on any sand bars on that river except when setting my traps. (R. 4449, Vol. 25.)

Harry Taylor Howland testified: I went to Green River Utah, in 1893, and took a prospecting and trapping trip thence down the river to a point near the junction, where we got fox, wild cat, beaver and coyote furs. Our boat was 16 or 18 feet long, with a 3½-foot beam. We brought our skins back up the river to Green River in our boat, being gone about

sixty days during December and January. In August, 1894, I went trapping down the Colorado River from Moab to the junction and thence up the Green River to Green River, Utah, bringing in some furs similar to those I obtained on my first trip. In 1895, I took a Denver man and two other men from Green River to Moab, receiving compensation from the Denver man for this trip. My partner and I came in our boat back down the Colorado and up the Green River to Green River, Utah, doing some trapping on our way back. In 1897, I took my wife and young baby, my father and another man and lady on a 25-mile trip down the Green River and return. In 1897, I moved away, but returned in 1903 or 1904, when I made a few short boat trips to Wolverton's Ranch. Again I moved away and returned to Green River, Utah, in 1908 or 1909. I then went on a trip in the Marguerite from Green River to Moab when the Salt Lake business men made that trip. In 1910, I went down to the mouth of the Green and up the Colorado to Indian Creek, and return with my wife and three boys, ranging in age from fourteen to six years. I had an 18-foot boat, with a 4-foot beam, on this trip, Defendant's Exhibit No. 17 being a picture of that boat. I had arranged with Mr. Wolverton to meet us with his power boat and tow us up the Green from the junction but got 35 or 40 miles upstream before we met him and he towed us from that point up to Wimmer's Ranch. We had no life preservers with us on any of these trips, including those taken by the women and children. Just after the last mentioned trip, I entered the employ of the D. & R. G. W. Railroad Company, and have since only made a few trips to points 25 miles down the river from town. (R. 4603-16, Vol. 26.)

In March, 1928, I went from North Wash to Lees Ferry with the Galloways in open boats. On that trip we did not ship any water and encountered no difficulties. I recall encountering no serious trouble on any of the trips I have referred to except that if we

got out of the channel we would strike a sand bar. We had no serious trouble. (R. 4616-9, Vol. 26.) It is easier to tow than to row upstream, and coming upstream with non-power boats I would change off, but would tow more than I would row. Occasionally Green River freezes over in winter, but it doesn't occur every year. (R. 4622-3, Vol. 26.) On the lower Colorado River trip we didn't encounter what I would term rapids. On neither the Green nor Colorado do the channels shift about unless there is some flood; the channels generally appear in the same place every year, although there may be some obstruction in high water that will divert the current and change the channel. I can't say that I haven't been on a sand bar on any trip. That is my signature on Exhibit 630. It was prepared by Mr. Ryan, and I aimed to tell him substantially the same facts that I have detailed here as a witness and did not tell him anything substantially different than I have told here today. I don't remember encountering any sand waves on the lower Colorado River trip. (R. 4624-32, Vol. 26.)

H. J. Howland testified: I am 29 years old and have lived at Green River, Utah, most of my life. I recall no difficulties on the trip I took with my father in 1910 down the Green and up the Colorado to Indian Creek and return. As I grew older, I had occasion to make other Green River trips. In 1915, I went down to Valentine Bottom in October and came back the first of December. This was a trapping and hunting trip with my brother, and we brought back with us in our boat fox, coyote, badger and other furs. Next year, between October 22nd and the first part of December, we made substantially the same trip, bringing our furs back with us in our boat. We encountered no difficulties. (R. 4634-7, Vol. 26.)

In 1921, I was with Mr. Wimmer on the lower Colorado when he was carrying supplies to the survey party. We made several river trips from Hall's Crossing, generally carrying four or five hundred

pounds but at times as much as a thousand or fifteen hundred pounds on the boat. I accompanied my father on his trip with the Galloways from North Wash to Lees Ferry. During my boating experience on these rivers I have never had any difficulty with non-power boats except the work incident to coming upstream. There is no need of getting stuck on sand bars if you follow the channel. With the power boat on the lower Colorado we encountered no difficulties at all. At Bull Frog Rapids I had to help the motor boat with the oars, but that was the only difficulty we had. On several occasions we went up over Bull Frog Rapids with that two-horse power engine. (R. 4637-40, Vol. 26.)

I have not been on the Green River in a power boat except right around the bridge, and in the other boats in which I have taken my downstream trips I don't recall touching bottom at the riffles or bars between town and the mouth of the San Rafael; we may have scraped a rock at some place but not because of shallow water. When coming upstream on these trips we may have struck a sand bar because you usually take advantage of the back water when you are rowing upstream and will continue on even though you know there is a sand bar there with the hope of getting around it. Those are the only sand bars we got on during my trips. (R. 4640-3, Vol. 26.) Most of the time on the lower Colorado we would have to help our motor boat up Bull Frog Rapids, but some times we made it up over those rapids without helping the boat. (R. 4645, Vol. 26.) I do not remember any place in the river where there is a ledge of rock clear across the stream near Lake Canyon; I have heard of it, but we did not touch bottom there. (R. 4647, Vol. 26.)

Mrs. H. T. Howland testified: I am a sister of Mr. Joseph Ross, and was on the trip with him when he went down to Valentine Bottom to bring out the Valentine family. I recall no difficulties with sand bars

on that trip, and my recollection corresponds with that of my son and husband as to the 1910 trip to Indian Creek. (R. 4651-3, Vol. 26.)

George H. Franz testified: I am a freight contractor at Green River, Utah. In 1921, I went to the junction and return with a party of geologists in one of Captain Yokey's power boats. It was 5 or 6 feet wide and about 24 feet long. There were eight in our party and they employed me to take them down to the junction. No other member of the party had ever been on the river before to my knowledge and that was my first trip on the river (except to cross in a boat there at the town) and it was the first time I ever operated a motor boat. Every one took a turn at piloting the boat and I operated the engine. It was late in the summer or early fall, when the water was at a low stage. The engine in this boat was a wreck when we started out and was rated at about six-horse power. We had no trouble keeping in the channel of the river and the only difficulty encountered in going downstream was that once we stuck on a sand bar four or five minutes. The geologists were met at the junction by another power boat, their destination being Moab. I came back up the Green River with my boat and tied it up at Little Valley, four miles below town, that being the point where I had obtained the boat and from which we started on our river trip. On my upstream journey I encountered no difficulty in navigating the stream. On the downstream trip the party stopped to examine the country at different places and we consumed five days; I made the upstream journey in 2½ days. (R. 4653-9, Vol. 26.)

Guy Sterling testified: I am a civil engineer. In 1908 I made a boat trip from Green River, Utah, to the head of Cataract Canyon and return using a 30-foot boat with a 5-foot beam, equipped with an engine and propeller; the boat belonged to Milton Oppenheimer, whom I employed to take me down so that

I could make an examination for a tentative damsite below the junction of the rivers. On the upstream trip we consumed 2½ days, reaching a point 15 miles below Green River, Utah. When we reached that point something about the engine broke. I camped there that night and Mr. Oppenheimer went to Green River and came back with a stern wheel boat, 12 or 15 feet wide and from 30 to 35 feet long, propelled by a steam engine. He towed the boat in which we had made the river trip up to Green River, Utah, making the 15 miles between 9:00 o'clock a. m. and 2:00 o'clock p. m. We encountered no sand bars on the downstream trip and I recall no trouble of any character going down. On the upstream trip the only difficulty or mishap encountered was the breaking of the engine of our first boat; we encountered no trouble from sand bars or with rapid water. In July, 1907, I made another trip from Green River, Utah, to the head of Cataract Canyon and return in a gasoline power boat. On that occasion we met with no mishap of any kind and encountered no difficulties. (R. 4681-7, Vol. 26.)

The stage of water was approximately the same on each of these trips, although probably a little higher on the 1908 trip. (R. 4687-8, Vol. 26.)

Jesse M. Branson testified: In 1897 and 1898 my father, with whom I was associated, was operating a sawmill on Castle Creek and supplied the Moab country with lumber, rafting the lumber on the Colorado River between the mouth of Castle Creek and Moab during those years. Between 1902 and 1909 our sawmill was on Fisher Point in the LaSal Mountains and during that period we again shipped lumber to Moab, rafting it on the river from the mouth of Castle Creek down. Our mill on Castle Creek was 16 miles and our Mill on Fisher Point was 22 miles from the river, to which we hauled our lumber with teams. The size of our rafts would depend on the size of lumber ordered and would average around 64 feet in length by

16 feet in width and we would carry down from 10,000 to 15,000 feet of lumber on a raft. During the years that we were rafting there we sent down approximately ten rafts of lumber per year. Ordinarily there would be two men accompanying each raft and sometimes we took two rafts down together containing about 26,000 feet of lumber. These raft trips were taken between June and December and we have rafted lumber during each of the months of the year from June to December. (R. 4709-14, Vol. 27.) During that time we would sometimes go down to Moab with a wagonload of lumber, but only a very small portion of our lumber was taken to Moab in any other way than upon rafts on the Colorado River. It was a cheaper and easier method of transportation because two men could run 10,000 feet of lumber in one or two days on a raft, whereas it would take six or seven 4-horse teams and six or seven men to transport the same amount overland. Aside from losing about 3000 feet of lumber from one raft, we had no mishap in which we lost any of the lumber rafted by us during those years and all of our rafts got through. (R. 4715-17, Vol. 27.) I have gone down from Castle Creek to Moab in a boat. On other occasions I have gone down part of the way; we had some cattle on the river bottom about 6 miles below Castle Creek and I would go down to look after them. On our return journey we would take the boats back upstream. I would take a trip clear to Moab merely for pleasure and as a sort of vacation. Over the riffles I would tow the boat—at the Narrows—for a distance of about a quarter of a mile. It was not necessary to wade the stream while towing. I had some brothers who went with me on those trips. The shallowest place on the river I have seen was at Nigger Bill riffle, where the water was up to a man's waist. (R. 4718-21, Vol. 27.) Once in a while, in bringing down a raft, it would get stuck on a submerged rock, but this wouldn't occur on every trip and it was not a common occurrence. None of our rafts ever were stuck

in the mud or on sand bars. We have had difficulty with mud getting in between the boards. The only effect of this was to make the lumber soggy and cause the raft to draw more water and to run slower. Our rafts were made out of lumber and were not log rafts. We never had to tow them downstream and the only power used was the current. (R. 4727-9, Vol. 27.) We did not have trouble with ice in the winter. After accompanying a raft down we would go back up to the sawmill with a team and wagon. In bringing a raft down I have had occasion to get in the water when it got stuck on a rock in order to shake it loose. (R. 4731, Vol. 27.)

Thomas G. Wimmer testified: I am 62 years old and live in San Diego, Cal. In 1900, I engaged in the sheep business north of Green River, Utah, and there had a small row boat. In 1904 or 1905, I moved to Green River, Utah, and bought a ranch at the mouth of the San Rafael. During that time I took several short boat trips with Mr. Wolverton. After I bought my ranch below town, Mr. Wolverton built for me a boat that I called the Marguerite. It was 33 feet long, 7 or 8 feet wide, with a light draft empty. When loaded with more than three tons its draft was in excess of 2½ feet. At one time I had a stern wheel on it, at another time a propeller, and at another time both side and stern wheels. It was propelled by a gas engine. I got this boat in 1906 or 1907 and took my last trip in it in 1915. (R. 4732-7, Vol. 27.)

About 1910 I went into the general hauling and delivery business at the town of Green River and then had printed advertisements of my business, which I circulated, and I solicited business for river transportation and engaged in that business. (R. 4737-8, Vol. 27.) I made trips with the Marguerite between my ranch and Green River, Utah, whenever I had occasion to do so from early spring on through the season so long as there was no ice. For a time my family were on my ranch, but I used to take them

to Salt Lake during the school year and did not take trips so frequently after they ceased living at the ranch. I took the 1914 government party out about Thanksgiving time. I have made trips between my ranch and Green River every month from March to November, unless there was ice in those months, and I don't think there was ice during those months of the year. A conservative statement, which is rather under than over the number, would be that I have made fifty round trips between my ranch and Green River in the Marguerite. My first trip in the Marguerite from Green River, Utah, to Moab was just about Thanksgiving Day, 1909, when I took twenty-five business men on that journey. Aside from the trips I took to the junction when hauling for the government, I recall three round trips to that point and there might have been more. (R. 4742-5, Vol. 27.) I took my family in the Marguerite down to the junction of the rivers and back and on another occasion, in 1915, I took some engineers down there and back for compensation. I also took Mr. Richardson on a round trip for compensation. (R. 4745-6, Vol. 27.) When I was boating freight under contract with the government in 1914, I only made a few of the trips down to the junction. I can't give an estimate of the aggregate tonnage hauled by me under that contract but we would take down eight or ten tons at a trip on the scow, including coal, drill rods, supplies, etc. The Marguerite would start from Green River, Utah, and so would the catamaran scows. We would leave the other scows at the ranch, where they would be loaded with freight delivered there overland. There was a fine traction engine road built to my ranch from Floy, Utah, which was on the railroad and the coal taken down in the scow would be unloaded at Floy and not at Green River, Utah, and hauled from Floy to my ranch, 16 miles away. I took down the river one carload of coal, but I can't state the size of the carload. (R. 4747-9, Vol. 27.) I made a number of trips with my family

in the Marguerite to points below my ranch when I didn't go clear to the junction; I can't tell how many trips; I went whenever we wanted to go. I also made other trips for compensation for different parties to considerable distances below my ranch. I took one trip down 75 miles to bring out some engineers who were there. In 1924, I made two round trips from Green River, Utah, to Moab in a row boat equipped with an Evinrude motor. I took another round trip to Moab in 1925. All three of these trips were for compensation. The motor used was 4-horsepower. The last trip was taken at Thanksgiving time when the water was at a very low stage. (R. 4750-3, Vol. 27.) I remember the following power boats on the Green River: Cliff Dweller, City of Moab, two power boats belonging to Mr. Oppenheimer, two belonging to Mr. Wolverton, three that Mr. Yokey owned, one owned by Mr. Ladd, one owned by Mr. Blake, one owned by G. W. Shores, one owned by George Beebe, and both Mr. Shaw and Mr. A. I. Anderson had power boats. There were a good many row boats used on the river and nearly all the ranchers had a boat. I personally have had no experience except with power boats. (R. 4753-4, Vol. 27.)

In 1915, I entered the Colorado River at Hite and went from there to Lees Ferry in a row boat with Messrs. LaRue and Richardson. In 1921 I was boating on the lower Colorado River delivering supplies to government parties in an Evinrude motor boat which had a 2-horsepower motor. During that expedition I covered the river to a point 30 miles below Halls Crossing, also going on trips above Bullfrog Rapids probably twelve or fifteen times. I went up those rapids with my boat by helping it with the oars a little bit and without getting out and pushing or using a line. I began this work in the latter part of August or first of September and was engaged down there until late that fall. I met the Chenoeweth party about 30 miles above Halls Crossing but I can't remember how far upstream from Bullfrog Rapids I

delivered supplies. I went to the mouth of the San Juan carrying three men, bedding, weighing 500 pounds and 600 or 700 pounds of supplies. I made other trips downstream to points below Halls Crossing, once taking a 600 or 700 pound load to Rock Creek. Thus loaded the boat drew more than a foot of water and as loaded on the trip I have mentioned to the mouth of the San Juan its draft was 15 or 16 inches. I made a round trip from Halls Crossing to Escalante and other short trips. (R. 4755-61, Vol. 27.)

As we were going down to Lees Ferry on our way out in 1921, I saw the California-Edison boat. It couldn't get up the river with its load of supplies. It had a good engine but a very small stern wheel. I loaded some of the supplies into my boat and took them up to the party that needed them. (R. 4761-2, Vol. 27.)

In 1922 I again went to Lees Ferry and thence up to Halls Crossing with four boats in our party. The witness, Freeman, was in this party. Two of our motors went bad and with the other two motors we took the four boats upstream, taking a supply of gasoline for the round trip, our oil and supplies, I think each boat had a load of 700 pounds. There was plenty of water in the river. We had difficulty in getting up one place. I took up my boats just as they were but a man got out and held the nose of the boat, guiding it. (R. 4765-8, Vol. 27.) Both Messrs. Jones and Freeman simply wore their engines out by not taking care of them. I had no trouble with my motor and with a simple device avoided any difficulty from sand or in keeping my engine cool. In 1921 I had no trouble with my Evinrude motor and didn't use a pump at all in my cooling system. They put radiators on some of the larger boats, using no river water at all. However, the river water doesn't injure your engine, but if sand gets into a pump it may injure it. The simple device I have described avoids any navigation trouble on account of mud or sand in the water. (R. 4769-73, Vol. 27.)

In 1923 I went to Lees Ferry and thence to Warm Creek in the same boat of the California-Edison Company that I had seen before when it couldn't get up the river. They had consulted me with reference to changes in the boat, had taken out the 40-horsepower engine originally installed in it and put in a second hand engine out of a Ford car; they changed the paddle wheel from a 4-foot to an 8-foot wheel and put the paddles much farther apart. (R. 4774-6, Vol. 27.) Mr. Marrs operated the boat on that upstream trip and we had no trouble; it went up the stream fine, had no difficulty in going up any water we encountered and was not stuck on any sand bars. The same is true of the return trip down stream. (R. 4798, Vol. 27.) If you have a 4-foot paddle wheel and a 2-horsepower engine, it might work because it wouldn't turn the wheel so fast that it wouldn't be able to hold some water. If the paddles are too close together, or if the paddle wheel is too small, it will turn so fast that you will get no power. With a big engine a small paddle wheel will act like a propeller and will not get hold of much water. (R. 4778-9, Vol. 27.)

From my ranch up to Green River, Utah, there is swift water at a number of places and in navigating upstreams on that stretch it is simply a matter of power except at the Brown riffle, where it is dangerous because washes come in on opposite sides of the river at that place and there are rocks which must be avoided. However, I have never had an accident there or any trouble except that occasioned by the strong current. I have never failed to make it upstream through those riffles in the Marguerite except when I had engine trouble, which occurred on three different occasions. (R. 4781-3, Vol. 27.) On the stretch of river between my ranch down to the junction and thence up to Moab and return I have never had any serious trouble. I never was stuck on sand bars with the Marguerite. In going up through the Slide I had no difficulty. (R. 4783-4, Vol. 27.) In all

my experience on that portion of the Colorado River below Cataract Canyon I recall no instance where I had any trouble except on one occasion in going downstream with the government party. My son and I were running a race and he was beating me; I attempted to take a short cut and lodged on a sand bar. That is the nearest to any trouble I ever had in navigating that portion of the Colorado. I know of no conditions there which make it impracticable or unsafe to operate a properly constructed power boat up and downstream. I think I could do anything on that portion of the Colorado River below Cataract Canyon that I have done on the Green River with the same boats. (R. 4784-6, Vol. 27.)

Some of the side washes are very large and at times quite large floods come down them and deposit a large amount of silt—sometimes rock. This usually occurs in the fall of the year when the river is lower and will push it over a little bit, making a narrow place with rapid water. I have not seen such conditions created where a channel has not been left through which boats of the type I have operated could pass up and down. As the river washes it away the condition created by these side floods disappears. In Labyrinth and Stillwater Canyons I have never seen the channel so narrow or so low that I couldn't go up and down in the Marguerite. Nor did I ever meet with a condition that stopped my progress in that boat. I have seen both the Green and Colorado Rivers where for some distance the stream is divided, and on the first trip downstream at such a place you can't always tell which is the proper channel. Usually at a bend the long way around is the proper channel and we try that first but are sometimes fooled. On a straight stretch in the river where there is a braided channel I have never had any trouble and was always able to locate the proper channel. (R. 4787-90, Vol. 27.) In going downstream for the first time during a given year you may come to a place where the water divides into two or more streams and

one may look as good as the other; you may go down one for a distance and find that it becomes shallow and the water from it may go over a shallow bar into one of the other channels so that you can't continue down. Coming upstream it is much easier to pick the right channel than going down. In my experience I have never found a condition where there was not a channel if I knew where to find it. If I have made a recent trip down the river I know where I will find the channel unless in the meantime there was been a big flood. (R. 4791-2, Vol. 27.) The swiftest part of the water may or may not be in the channel of the river. As the water rises it may strike a rock bank which will cause a current across the river in a different place from the low water channel. (R. 4795, Vol. 27.) When I stated that I was never stuck on a sand bar with the Marguerite I didn't mean that I had never hit a sand bar with that boat; I meant that I always got through. (R. 4802, Vol. 27.)

Defendant's Exhibit No. 20 is a photograph of the engineers going down the Colorado River from Halls Crossing. Defendant's Exhibit No. 19 is a photograph of the Marguerite and a scow we used to haul the government freight down to the junction of the rivers while drilling was there in progress. (R. 4803, Vol. 27.)

There were water wheels constructed on the edge of the Green River; they were of permanent construction and I know of no instance when the water did not reach up to those water wheels so they could be operated or where the course of the river so changed that the water wouldn't reach the water wheels. (R. 4806, Vol. 27.)

As to the comparative cost of land freighting and river freighting, I know that it cost me less per ton mile to haul freight on the river than overland. (R. 4808-11, Vol. 27. The witness here gives data upon which he bases the foregoing conclusion; also at R. 4840-9.) My experience has been that overland freighting in that section of the country is accom-

panied by more hazard than carrying freight on the river. The roads are not good and you can only load 1000 pounds to a horse. (R. 4811-12, Vol. 27.)

On the upstream trip when the witness Freeman was in the party it was only necessary to tow once; that was at Bridge Canyon. (R. 4816, Vol. 27.) I was not in the water at the ledge near Lake Canyon but know of its existence and there is a cut through the ledge there about 30 feet wide and our propeller didn't strike the ledge, although it was running when we went up over that place. (R. 4818-20, Vol. 27.) I don't think there is much difference between the water below Bridge Canyon and that above Bridge Canyon on the lower Colorado. (R. 4821-2, Vol. 27.)

I don't think the low water channel shifts; the current shifts. In making a trip down the river this year you will find the channel in the same place as last year; as to sand bars, I am not looking for them—I try to find the channel; the sand bars don't amount to much. (R. 4838-9, Vol. 27.)

One of the government men asked me to make the statement marked Complainant's Exhibit 631. I was later subpoenaed by the government and regularly attended court in Los Angeles under government subpoena. When I say in that exhibit that we are more liable in exceedingly high water to run across a bar in the center of the stream because of the channel (which should be current) going to one side or the other, the bar to which I refer is what we term a permanent island which is submerged in real high water. During high water you can run in almost any part of the water on that river; if we get careless and do not try to follow a channel but simply go downstream we might hit one of those submerged bars. During high water you aren't really hunting for a channel. (R. 4850-1, Vol. 27.) When I say in said exhibit that you cannot depend upon boating in the winter because the ice will form, I mean that sometimes the water freezes in winter and it is pretty hard boating there at such times; you can't depend on

boating the river in the winter because some years the ice will form and some years it won't. (R. 4851-2, Vol. 27.) When I say in said exhibit that boating operations from Moab to Green River for commercial purposes such as the hauling of farm produce and freight is not a feasible proposition now or ever, I mean that it is 35 miles from Moab to the railroad over a truck highway and 200 miles to Green River by boat and I don't call it feasible to haul 200 miles when you can haul 35 miles by truck. (R. 4853, Vol. 27.)

There are more rapids on the Colorado River between Halls Crossing and Warm Creek than there are on the Green River between the mouth of the San Rafael and the mouth of the Green. I would say that there is practically no difference between the last mentioned section of the Green and the last mentioned section of the Colorado in going downstream because there is plenty of water in both sections. Going upstream the current is a little stronger on the Colorado than on the Green so that in coming upstream on the Colorado a little more power would be required than in going upstream on the Green. (R. 4855-7, Vol. 27.) The practicability of navigation up and downstream on the section of the Colorado River just mentioned is substantially the same as on the Green River. (R. 4858, Vol. 27.)

Mrs. Allien Russon testified: I reside in Salt Lake City, am 22 years old and was born at Moab, Utah. When I lived in Moab I made several boat trips on the Colorado River and have seen many others at Moab use boats up and down that river. My first power boat trip was about May 7, 1925, when I went from Moab to Well No. 1 and return on the large Moab Garage boat. The boat was not stalled at any place and there were no navigation difficulties. The first part of September of the same year I made a trip from Moab to Well No. 1 and return in a small motor boat, two boys and another girl being with

me. So far as I am aware no member of the party had had any former experience with motor boats or on the Colorado River except one of the boys who said he had made one trip. That boy piloted the boat on the downstream trip except for two miles, when I piloted it. We encountered no sand bars or other difficulties on that trip. (R. 4865-70, Vol. 27.)

W. F. Reeder testified: I first went to Green River, Utah, in 1921, and for a time made my home at Elgin on the east bank of the river opposite Green River, Utah. (R. 4870-3, Vol. 27.) In August, 1902, I went down the Green River to the head of Cataract Canyon and back with a companion in a row boat 16 feet long and 4 feet wide, taking our supplies with us. Between 1902 and 1906 I took these trips on the Green River to the junction and on one trip went to the junction and thence up to Moab. These were all trips in row boats and I made an additional trip in a power boat. On each of the occasions when I went to Moab we there re-supplied and came back in our boats to Green River, Utah. In going upstream in row boats we rowed and towed and when the wind was favorable we sailed. (R. 4873-9, Vol. 27.)

In October, 1914, we went from Green River, Utah, to Hite with Charles Russell. We ran all of the rapids in Cataract Canyon but one, which we portaged because Russell had lost the oars on his boat; we recovered the oars later. (R. 4884-5, Vol. 27.)

There are sand bars on the Green River that you can run on to in row boats if you aren't careful, but we always had plenty of water. Going upstream we row, take advantage of the eddies at the side and keep out of the deep water, thus sometimes running on to a sand bar from which you can push off and have plenty of water. What I have said is also true of my row boat trips on the Colorado River. I recall encountering no difficulties on the power boat trip I took and we did not get hung up on a sand bar a single time. Mr. Wheeler had a ranch, now called the

Wimmer ranch, and I made several trips up and down the river with him. I never had a mishap on any boat trip I have taken and no trouble or annoyance except the ordinary work of getting up and down stream. I always reached the destination I started for. (R. 4887-9, Vol. 27.)

I took these prospecting trips with Mr. Wheeler in 1902 and 1903. My trip with Russell was for the purpose of taking moving pictures. I had had a lot of boating experience on other rivers before I went to Green River, Utah. (R. 4890-4, Vol. 27.)

A. L. Chaffin testified: I am 44 years old and went to the Colorado River in October or November of 1898 or 1899 and remained on the river about four months until the following spring. There were then five men working on the Moquie Bar. Our supplies came overland to Hanson Creek and were boated thence to the Moquie Bar in a 16-foot row boat, which we rowed, poled and towed. (R. 4899-4901, Vol. 28.) In the spring I left the river and came back to Hanson Creek in October and again worked on the Moquie Bar, where we received our supplies as above stated. Our boat drew about 15 inches of water loaded. During that stay on the river Mr. Ryan came down from the California Bar and I went with him up to Good Hope about 21 miles away for the mail, rowing, poling and towing Ryan's boat. (R. 4903-5, Vol. 28.) That fall William Mitchell brought a load of supplies to the mouth of Hanson Creek, installed a steam boiler and engine in his boat, and took three tons of supplies and mining equipment thence down the river to the Klondyke Bar. His boat was about 26 feet long and 10 feet wide and drew from 18 inches to 2 feet of water loaded. (R. 4905-7, Vol. 28.) Frank Bennett and Mike Ryan, who were then operating at the California Bar, used to come down to see us and we would go up to see them during that time, using light draft, nonpower boats. In the early part of 1901 or about that year, Stanton's party, with two or three

boats, posted notices on placer claims in the river and went down by our camp, carrying camp outfits and supplies in their boats. During that period Andy Strauss with two boats, five men and two ladies came down the river from Dandy Crossing and continued on down to Hall Creek. We made a boat trip down to the Strauss camp that winter. The Strauss boats wouldn't draw over 8 inches of water unless heavily loaded. (R. 4907-10, Vol. 28.) Bert Seaboldt was operating on the Good Hope Bar and Ryan and I made a trip there for the mail that season. The people who were operating the Good Hope Bar made various trips up and down the river for supplies to Dandy Crossing and would bring mail down to Good Hope Bar, and some of us would go up to Good Hope in a boat and get the mail; sometimes we would bring mail for the Strauss party down to our camp and they would come up and get it from us. (R. 4911, Vol. 28.) On upstream trips we would row where there was easy water; in the smooth water we might tow or pole, depending on conditions. While it is all work it would be a relief to change from rowing to towing or poling. (R. 4912, Vol. 28.) I left the river in the spring and went in again about May or June of the next year, working for the Moquie Mining Company, which was operating the Olympia Bar. We built a boat at Hite which was 28 feet long, 8 feet wide, and had sides about 3½ feet high, which was named the Lucy B. We took that boat and two other boats and a raft down the river from Hite to Olympia Bar, 33 miles below, loading about two and a half tons of supplies and mining equipment on the big boat and about 1500 feet of lumber and some grain on the raft. We encountered no difficulties on that trip and I don't recall that we were hung up at any place. I then stayed down there on the river until about 1904. (R. 4914-19, Vol. 28.) During that last mentioned stay on the river I made some upstream trips with the Lucy B., which had an old automobile engine in it supposed to develop about 6-horsepower.

I don't think the engine developed over two or three horsepower. Sometimes it would pull pretty good, but if it got a little too warm it would stop, and if wind was blowing the tubes wouldn't heat and it would stop; the engine would stop going either up or downstream. I made trips in that boat carrying supplies, mining equipment, lumber, rails and other types of freight to different points on the river. Among the trips I made were trips to Good Hope Bar and to Moquie Bar. (R. 4919-21, Vol. 28.) After we removed the engine from Lucy B., I made several trips with it; once to Dandy Crossing for a load of supplies that I brought back to Good Hope. There we built a raft and took a 2-ton load on down to Olympia Bar. We had no difficulty in going upstream with the Lucy B., sailing a good deal of the way, and on the down trip journey we had no difficulty. (R. 4922-3, Vol. 28.) We made a trip with the Lucy B. to where Strauss was operating at the Anderson Bar below Halls Crossing, there got a load of pipe, and came back upstream. We sailed most of the way back and sailed practically up Bullfrog Rapids when there was a lull in the wind and we had to help the boat a little distance. From there on to Olympia Bar we sailed most of the way. I made several other trips besides those I have mentioned. We made several trips up to Good Hope Bar for mail, sailing upstream. (R. 4923-4, Vol. 28.) I never encountered any trouble with sand bars except when going upstream, keeping close to the shore in order to avoid the current and get easy water. My boat never encountered a sand bar when it was in the channel of the river. (R. 4924-5, Vol. 28.) I recall one trip in a small boat from Olympia Bar up to North Wash where we picked up a third man and went on up to Dark Canyon, rowing, towing, sailing and poling. (R. 4925, Vol. 28.) In 1903 or 1904 I acted as watchman at the old Stanton dredge and for six or seven months ran a trading post on the river. My first supplies came in at Hanson Creek and I boated them down to the dredge;

other supplies came to the river at Wilson Creek. I used a scow with a stern wheel on it that was equipped with a 4-horsepower engine for bringing up one load of supplies and also for carrying wood; that scow was 14 feet wide and 28 or 30 feet long. I took loads of stuff to trade to the Indians for blankets, baskets and pottery. I would ferry the Indians across the river and after we had finished trading would take them and what they had back across the stream. (R. 4926-30, Vol. 28.) I have sailed up all portions of the river between Halls Crossing and Hite except a 4-mile stretch above Red Canyon. I did no sailing going downstream. (R. 4931-2, Vol. 28.) I was away from the river for about a year, returning in 1904 or 1905 to the Moquie Bar. At that time I took a trip in the Lucy B. to Olympia Bar, bringing back camp equipment. I did some work for Cass Hite at Tickaboo and Red Canyon, making two or three river trips from Red Canyon to Dandy Crossing for supplies. I made a raft trip with a load of from 1000 pounds to a ton on the raft, towing the raft behind a 16-foot boat. (R. 4932-5, Vol. 28.) After the holidays that year I made a boat trip down to a bar below the mouth of the San Juan River with a man we called Klondyke and then came back up the river to Cass Hite's poling practically all the way, although we rowed and sailed some. Klondyke was an expert poler. This was in December or January; we had no trouble with ice and we had no difficulty getting up the rapids except the hard work of poling, and we poled up through every rapid without getting out of the boat or towing. I know a place near Lake Canyon where there is a ledge of rock that extends out into the river, but there is a channel there perhaps 20 or 25 feet wide, and on this trip our boat did not strike there, although the water was at low stage. (R. 4935-9, Vol. 28.) I was on the river in the latter part of 1905 and the early part of 1906, operating the Adams Bar at Red Canyon with Frank Bennett. We got our supplies by boat from Hite. (R. 4939-40, Vol. 28.)

After leaving the river in 1906 I was not back again until 1925, when for about three months I placer mined on the California Bar. I made a boat trip up to Olympia Bar and got some mining equipment, and I also went down to the old dredge and got some things, using a 16-foot boat. (R. 4940-1, Vol. 28.) During the 19 or 20 years that I was away from the river I noticed very little changes in the river or its bed. It looked about the same and everything seemed natural. Sometimes when big floods come down a side canyon carrying material into the river the river will be pushed towards the opposite bank for a short time, but there will always be a channel there. Sometimes deposits of sand and silt from side canyons will extend out into the river for a few days but the natural flow of the river is so much larger than any of those side floods that the main stream carries on; there is always a channel and I have experienced no difficulties in navigation because of conditions resulting from floods down side canyons. During my visit to the river when I was watching the dredge I remained right there for about two and a half years, not being away for more than a week or two at any time. (R. 4942-4, Vol. 28.) Aside from my experiences on the Colorado I have had experience with power boats in Utah, Oregon and California, and have operated them in those states. In my judgment a 20-horsepower motor would take a 24-foot boat with a load of a ton or more up to Hite on the Colorado River without experiencing any difficulty at any of the rapids on the portion of the river with which I am familiar. (R. 4944-51, Vol. 28.)

I was only 12 or 13 years old when I first went to work on the Colorado River. I had never gotten on sand bars going downstream and don't recall ever getting into the water to get off a sand bar. A very few times I have seen other people operating boats get in the water to get off a sand bar. Occasionally when going upstream when you are in the easy water you will run on to a bar, but you can usually

get off the bar by using a pole. I remember occasionally at Hanson Creek Rapid a boat would hit on a rock and some member of the party would get out and help it off, but that did not happen frequently and I never saw it happen at Trachyte or North Wash Rapid. (R. 4951-4, Vol. 28.) When I spoke of being able to go up the river with a 20-horsepower boat with a ton load, I meant that it could go upstream with that load at any stage of water. (R. 4955-7, Vol. 28.) After I quit operating the trading post a man by the name of Newby operated it for about a year. (R. 4962-3, Vol. 28.) I have never forded the river on foot but horses have swum across it. (R. 4964-5, Vol. 28.) I have made trips up and down the Colorado River in all stages of water, including the spring floods and the summer floods that come from heavy rains. If we had supplies to get, I went and got them. It was harder work in high water and I avoided such trips as much as I could. May and June are the high water months. (R. 4967-8, Vol. 28.) I have only noticed very slight changes in the channel down there; a flood might bring in a sand bar but it would not be in the main channel and these changes did not have any effect that you would notice on the river bed or the bars. (R. 4968-9, Vol. 28.)

Thomas Fotheringham testified: I am 62 years old and was on the Colorado River in 1888 and 1889. We hauled lumber, supplies, tools and machinery down to Hole-in-the-Rock, there built a boat 38 feet long and 16 or 18 feet wide with two decks. We slept on the lower deck and had most of our provisions down there. On the upper deck we had a carpenter shop and blacksmith's shop, with anvil and tools and did our cooking on that deck. We loaded on to the boat a tub 5 feet high and 6 or 8 feet in circumference which had four paddles and used it in our placer operations. We also had a hydraulic pump, screens, two amalgamating boxes with seven amal-

gamators in each. The boat had a load of two or three tons. We also built a small skiff. After we got our boats built and loaded we started down the river in December, 1888, first stopping at a bar 8 miles below. While working that bar we had additional supplies shipped overland to Hole-in-the-Rock and brought them down to the bar in our small boat. We next took our boats and cargo down to a bar located 10 miles below the mouth of the San Juan River and worked that bar for about two months. One member of our party went farther on down the river in the skiff and located another bar 15 or 20 miles farther down where we could use the hydraulic pump. The rest of us didn't want to go downstream with the big boat because it was then high water, but he insisted and we started down. The high water made it impossible for us to handle the big boat. It was so big and bulky that we couldn't pull it in and make a landing there and we continued on down the river, landing just above Lees Ferry. We made a little money in our operations. While we were there on the river two men came downstream in a boat and stayed with us overnight. I also saw three different outfit of trappers. Two different boats with two trappers in each boat were going upstream when we saw them and another boat with two trappers was going upstream. The first trappers we saw had a load of furs and the other two parties had furs but not so many as the first party. Our principal trouble there on the river was in not having a few sand bars out in the middle of the stream to stop us when we went downstream the last time; we just kept right on going. When coming down to the first bar we worked or when coming down to the second bar we worked or when bringing in the supplies with our skiff, we were not hung up anywhere and had no trouble with sand bars. (R. 4975-90, Vol. 28.) I helped take the little boat upstream. We rowed it and did not tow it. All of our upstream trips were

in low water. The river did not freeze that winter. Our big boat drew about 18 inches of water loaded. (R. 4991-2, Vol. 28.)

Clarence E. Baldwin testified: I am 49 years old and Mr. Clark who has testified in this case and I are the principal owners of the Moab Garage Company, for which company the witness Virgil Baldwin, my brother, worked. I have personally operated some of our boats and looked after all of them, checking on the freight and equipment. The first boat I operated was called the Punkin Seed; it was a passenger boat, 20 feet long, 9 feet wide, with a draft of 20 or 22 inches under ordinary load. It was equipped with an old Ford automobile motor and Defendant's Exhibit No. 21 is a photograph of that boat. In it we carried groceries, small freight and passengers. It took about four hours to go with that boat from Moab to Lockhart and seven or eight hours for the upstream trip, depending on its load. (R. 4996-5003, Vol. 29.) We had another 20-foot boat with a 4½-foot beam, equipped with a Ford automobile motor that we called the Black boat. I operated that boat for seven or eight months between Moab and Shafer No. 1 and No. 2 Wells and Lockhart. It was used for passengers and small freight and in it the trip down to Lockhart consumed about four hours and the upstream trip seven or eight hours. We had another boat 26 feet long and 6 feet wide, equipped with a Chandler motor. In Defendant's Exhibit No. 22 the Chandler boat is shown next to the bank of the river and the large boat there appearing is our barge. The Chandler boat drew 19 or 20 inches of water empty and about 2 feet loaded. It was used principally for hauling passengers and for small freight. I have hauled as high as ten passengers and 2500 pounds was a fair load for that boat, but I have had on it as much as two tons. I have taken trips down to the junction and back, also to Lockhart and the wells in that boat. When I went to the junction it was low

water stage; I had no difficulty in getting up or down the Slide. It ordinarily took about four hours to go from Moab to Lockhart in that boat and six or seven hours to come back upstream. (R. 5003-9, Vol. 29.)

In operating the Punkin Seed we would occasionally hit a sand bar and I don't think we were ever held up on a bar with that boat more than five minutes. I believe I got out of that boat on one occasion when we were delayed about ten minutes. In operating the Black boat I also hit a sand bar once in a while but don't think I was ever held up more than ten minutes with that boat. On the occasion when I was held up ten minutes with the Punkin Seed it was because I missed the channel a little. There was a channel there and if I had followed it I wouldn't have been delayed even that ten minutes. Whenever I had my delays on the Black boat it was because I missed the channel. When operating right along we would hardly ever have any trouble with either the Black boat or the Punkin Seed, and trip after we would never touch anything. During the six or seven months that I operated the Punkin Seed and Black boat, I made from one to four round trips a week. During the sixteen months that I operated the boat equipped with the Chandler engine, I never had any serious difficulties with sand bars or other obstruction to navigation. Except when I burned out the bearing on the Chandler the longest time I remember being delayed or held up from sand bars or other causes was not over thirty minutes; there were only three or four such occasions when I was delayed as much as thirty minutes. With that boat I would get on a sand bar for a minute or two or perhaps five minutes on about one trip out of ten. Difficulties were less frequent in operating the other two smaller boats. (R. 5009-13, Vol. 29.) I would say that a conservative statement of the number of round trips while operating the three boats I have mentioned would be one hundred and

I have made those trips during every months in the year. (R. 5014, Vol. 29.) We also had a barge, shown in the photograph Defendant's Exhibit No. 22. The passengers on the boat were the State Federation of Ladies' Clubs. We also had three outboard motor boats. (R. 5014-15, Vol. 29.) Defendant's Exhibit No. 25 is a picture of our barge with a party of geologists and oil men on board and was taken while a meal was being served. Defendant's Exhibit No. 24 is a picture of Shafer No. 1 Well and the machinery, equipment, lumber and structures there appearing were taken down the river on our barge. Defendant's Exhibit No. 26 shows a part of the barge as it was traveling down the river. The boat appearing on the deck of the barge is a square end canoe in which we at times used an Evinrude motor. (R. 5017-18, Vol. 29.) After the first trip with the barge my brother Virgil was practically in charge of it. (R. 5019, Vol. 29.) On those portions of the Colorado River with which I am familiar, its channel is always very near the same place except when heavy rains come down a side canyon, at which time the channel will be changed there for a week or ten days and then return to its original place; in a few days the river does its own housecleaning. When there has been a flood down a side canyon we would occasionally be bothered by a sand bar at that point on the first trip, but after the first trip would have very little difficulty. It was a part of my duty to keep track of the running of the boats and I endeavored to perform that duty. (R. 5020-1, Vol. 29.) Virgil is my mother's youngest son and she kept a diary of his boat trips. We got in the habit of referring to that diary whenever any question of dates or checking up on trips arose. Up to the time when she quit keeping her diary there had been approximately two hundred trips made with the big boat. Last month (November, 1929) we made seven round trips, four between Moab and Lockhart and return, three between Moab and Shafer No. I.

Well and one between Moab and Shafer No. 1-A Well. A conservative estimate of the tonnage hauled up and down the river by our company since it started river navigation in 1925 would be 3500 tons. We have hauled hundreds of passengers on all of the boats. These boat operations were commercially profitable to us. There was only one occasion when I was ever stopped in our operation; that was when the barge was caught in an ice jam. (R. 5022-6, Vol. 29.) We first charged $1.75 a hundred from Thompson on the railroad to Shafer No. 1. Well; later the charge was $1.00 per hundred, and most of our tonnage delivered there was at the lower rate. Our rate from Thompson to Well No. 2 was $1.25 a hundred. We hauled the freight from Thompson on the railroad to our dock at Moab on 5-ton trucks over good road maintained at public expense. The cost to us of our land haul per ton mile was greater than the cost per ton mile of our water haul. (R. 5026-52, Vol. 29. At the pages indicated the witness gives facts showing the cost of the land and water haul.) I am familiar with the country adjacent to the Colorado River between Moab and the mouth of the Green River and in my opinion it would not be feasible or practicable to build a road so as to make that country accessible to trucks. (R. 5033-8, Vol. 29.)

Complainant's Exhibit No. 632, being a schedule of rates filed with the Public Utilities Commission of Utah by Moab Garage Company in 1926 was received in evidence. (R. 5057-8, Vol. 29.)

I don't recall any freight to amount to anything being carried on the river except in our boats and the Moab merchants have not used the river to bring in their supplies or take them out. (R. 5061, Vol. 29.) After you learn how to do it, I would rather navigate the river in high water. In coming upstream we run our boats in the easy water and take advantage of the eddies, and in so doing have very little trouble with sand bars in high water. In

thus coming upstream you are more liable to run into sand bars. Our boats had no trouble making headway against the current in high water, although we wouldn't make headway in the swiftest places. We have been unable to make headway at those places only while we were crossing the river; then we wouldn't make much headway. We were always able to hold the boat upstream and we never let it be whipped around or encounter any trouble from any such cause. (R. 5066-7, Vol. 29.) The Punkin Seed would make three or four miles an hour upstream; the Chandler five or six miles an hour when loaded; and the Black boat was not quite as fast as the Chandler and a little faster than the Punkin Seed. Those upstream speeds would be made at any month of the year and during either high or low water. (R. 5069, Vol. 29.) Our Black boat is still at Moab, ready for use, although we have not used it for the last year. The Chandler boat is still there, but we have only made two trips with that boat this year. (R. 5071, Vol. 29.) At certain times of the year there is a bar at the mouth of Mill Creek which has given us trouble, the trouble generally being in July and August when they have big storms. After a storm we will be bothered there for a week or ten days. (R. 5074, Vol. 29.) I have run up the river with the Chandler boat beyond Nigger Bill to a point about 6 miles above Moab. The riffle at Nigger Bill doesn't amount to anything. (R. 5078-9, Vol. 29.) There were other people besides oil men and geologists who went down on our boats. We hauled camp outfits and equipment down the river for cattle men who had camps between No. 1 and No. 2 Wells. We hauled hay and grain or anything they happened to want down to them. On one occasion we hauled 200 fence posts down there. (R. 5083-4, Vol. 29.) On the trip that I mentioned with the Chandler boat above Moab, I had no trouble and did not get caught on any sand bars. (R. 5084, Vol. 29.) Any trouble we have encountered with sand bars or other conditions at or below our dock at Moab has not been of

sufficient gravity to cause us any great expense or to seriously consider moving our dock farther downstream. We weren't bothered much with sand bars except during July and August and with few exceptions we made our regular trips. (R. 5085-6, Vol. 29.) I have seen the Colorado River frozen over at Moab only once; that was in the winter of 1924-5. Every year it is filled with ice cakes which generally come in March and April when the ice along the shore thaws loose and floats down. We have never stayed off the river on account of ice flowing in it. (R. 5086-7, Vol. 29.) In 1910 two other men and I engaged a power boat belonging to E. T. Wolverton, which had a propeller in a tunnel. In October we went in that boat from Wolverton's ranch down to the mouth of the Green, thence up the Colorado River to the vicinity of Lockhart, where we hunted deer and then returned in the boat to the place we started from. We went up through the Slide under power and although we hit a sand bar once in a while we had no trouble to speak of. (R. 5089-90, Vol. 29.)

Bessie Walker testified: I am 18 years old. In 1926 I went with seven other people in a small Moab Garage boat from Moab down to the oil wells and back. My sister, who is now 14, and another girl about my own age, were in the party. On the upstream trip we three girls drove the boat four-fifths of the way and we encountered no trouble in going down or back upstream. (R. 5092-4, Vol. 29.)

Albert Beach testified: I am 40 years old and have lived in Moab for about 25 years. For some years I have been in the employ of Moab Garage Company. When I was a boy at Moab there was an old fellow they called Rocky who trapped on the Colorado River. Hy and Ed Turner also trapped on the Colorado and after their river trips I know they brought furs into Moab. (R. 5094-5, Vol. 29.) During 1927 and 1928 I worked on the barge of Moab

Garage Company with Virgil Baldwin. At certain times and certain places we had trouble with sand bars occasioned by floods coming down a side canyon. It would take three or four days for the river to wash away the material and get back to its original channel at that point. After the first trip through there we could get up and down without any trouble and we did not have trouble with sand bars at other points. There were two places where we had trouble with sand bars on two occasions when we had floods during the time I worked on the bars; one place was at Kane Wash and the other at a place lower down. I made thirty or thirty-five round trips on the barge and I should judge that we got on a sand bar four or five times during that period, the longest delay being for two hours at Kane Wash. The next longest delay was for about an hour at the wash below, and on the other occasions that we got on a bar we were only delayed a minute or two. (R. 5096-5101, Vol. 29.) I worked on the barge for about a month along in July or August, 1927, when the water was at low stage. The rest of my trips on the barge were in September or October, 1928. (R. 5102, Vol. 29.) On the occasion of the two longest delays which I have mentioned we took a line ashore to get the boat off the bar. (R. 5104, Vol. 29.)

Emeline Coote testified: I am a music teacher and live in Salt Lake City. In 1907 I accompanied Mrs. Wetzell, and Mr. Wetzell, then Supervisor of Music in the Salt Lake public schools, on a trip from Green River, Utah, to the Wolverton ranch in Mr. Wetzell's motor boat. We encountered no difficulties or troubles of any character on either the down or upstream trip, neither of us got out of the boat at any time, and we were not stuck on any sand bars. There was one place where the water was a little swift. I was raised in Ontario, Canada, and have operated boats on many of the rivers there. (R.

5109-11, Vol. 29.) In October, 1907, I went to Moab and had two boats built. I made a trip with Mr. and Mrs. Wilson from Moab upstream to a point a little above Jenson on the Colorado River. Mr. and Mrs. Wilson used a pair of oars and I sculled with a single oar. In going up or downstream over that stretch of the Colorado the only difficulty encountered was at the mouth of a stream that comes in where there was a swift current; at that point I just made a long leg and cut the current. (R. 5112, Vol. 29.) My trip up the Colorado River was made in October, 1907, and, as I remember it, Jenson's ranch to which we went is about 12 or probably 13 miles above Moab. (R. 5114-15, Vol. 29.)

Otto Empey testified: I am 48 years old, my folks moved to Moab when I was four or five years old and I left Moab in 1918 or 1919. As a boy at Moab I saw trappers on the river and have seen Rocky Powers come up the river in his boat with his skins after a trapping expedition. He trapped there for five or six years and had no other occupation that I know of. I also remember Ed Turner, Hy Turner, Charlie Turner and another trapper named Louis Petzell, who would bring their furs in their boats to Moab after a trapping expedition. I saw other boats on the river besides those of the trappers, have gone on hunting trips in my own boat, and others went down the river on hunting trips in their boats. I never had any difficulty or trouble with sand bars on the Colorado River. (R. 5116-19, Vol. 29.) I remember the Branson boys rafting lumber on the Colorado River over a period of 5, 6 or 7 years, maybe longer. As I grew older I rode the range some. At different times I have probably seen 8 or 10 of the Branson rafts. I remember a man named Brown and another man named Welsh who lived 12 or 15 miles up the river from Moab and who came down the river in their boats. Later I have seen what I suppose were the same boats upstream, tied

along the banks of the river at their homes. (R. 5119-21, Vol. 29.) I made a trip 10 or 12 miles upstream from Moab and back in the Undine. The boat tried to go up the riffle at that point and while using the capstan engine at that point the rope broke and we returned to Moab. That night they purchased a new rope and again went upstream, but I did not accompany them. I later saw the Undine after it was wrecked. (R. 5121-4, Vol. 29.) I have taken cattle across the Colorado River in low water when it was not necessary for them to swim; even at the very lowest water we always selected the shallow places where the water would come up to about the point of the shoulders or belly of the cattle. (R. 5125-7, Vol. 29.) Some years the Colorado River would freeze at Moab so that we would have skating. Then it would go probably two or three years and we wouldn't have any skating. I have seen the river frozen clear across five or six times. (R. 5128-30, Vol. 29.)

Charles A. Gibbons testified: I first went to Hite on the Colorado River in the eighties but remained there only two or three days. I saw Cass Hite and five or six other men. They had a raft 20 or 25 feet long by 16 or 18 feet wide, loaded with a boiler, engine, supplies, tools, etc. The boiler was about 12 or 15 feet long. I don't know the weight of the load on the raft. I saw them start out on their river journey. (R. 5132-5, Vol. 29.) Seven or eight years later I again went to Dandy Crossing and did some construction work for the Cass Hite Placer Mining Company at Good Hope Bar. At Tickaboo Bar I then saw the boiler and engine that I had seen leave on the raft on my first visit. While I was at Good Hope Bar equipment, hay, grain, scrapers, plows, etc., were brought down the river in boats and rafts from Dandy Crossing. (R. 5135-9, Vol. 29.) In 1899 I freighted a drill, lumber and supplies to Dandy Crossing for Mr. Stanton. They made a big barge on

which to carry their drilling outfit and put at least a 10-ton load on it. Later I saw the drill at different points on the river, the lowest point at which I saw it being 5 or 6 miles below Dandy Crossing. I didn't handle any boats during the period of which I am speaking. In 1900 I hauled a dredge and some other equipment and supplies for Mr. Stanton to a point just below Hanson Creek. The estimated weight of the dredge was 180 tons and it was all hauled on barges and boats up the river a half or three quarters of a mile to the point where it was set up. (R. 5140-3, Vol. 29.) On my visits to the river I saw boats going up and downstream. In going upstream they rowed their boats a good deal of the way; over the heavy water they had to tow for a distance where they couldn't take advantage of the big current in the riffles. In 1916 I took a boat trip from Red Canyon to Hite and return with Mr. Turner who brought back 300 or 400 pounds of supplies for my cattle outfit in his boat. I paid him for this service. On the upstream trip we sailed most of the way and I don't recall running into any sand bars. We towed up one or two riffles, including Trachyte Rapid. (R. 5143-5, Vol. 29.) When I was down to the Colorado River in 1916 there were prospectors working in a good many different places up and down the river. (R. 5150-1, Vol. 29.)

Henry Grimm testified: I have lived in Moab for about 36 years. In August, 1898, I went upstream from Moab about 22 miles in a 24-foot boat, having a beam of about 5 feet, with a load of 500 pounds. On our way up we camped at the mouth of Castle Creek and next day went about 2 miles farther upstream. We did not tow the boat but rowed it all the way upstream, including that stretch of water at Nigger Bill and at Castle Creek. We had two sets of oars. We came back downstream to Moab with a raft containing about 6000 feet of lumber, trailing the raft behind our boat. At the mouth of Castle

Creek the raft was stuck on a rock for about fifteen minutes but we got it off and had no other difficulties on our return journey. (R. 5180-4, Vol. 29.) Although I personally saw only one raft of lumber, I know that for a period of 8 or 10 years Moab lumber was hauled in wagons from the river up to town and there was no other way for the lumber to get there on the river except by rafts. (R. 5185-7, Vol. 29.)

Francis M. Shafer testified: In November, 1888, my brother built a raft at the mouth of Cisco Wash, 35 miles upstream from Moab and we loaded on to it a chest of carpenter tools, some trunks, bedding, supplies, material for a rocker, etc., all aggregating in weight at least 500 pounds, and started down the river to do some placer mining at the mouth of Castle Creek. There was brush and trees at the mouth of Castle Creek and we went on down without observing that creek until we finally reached Nigger Bill Canyon, 3 or 4 miles above Moab, and became satisfied that we had passed our intended destination. We there tied up our raft and walked into Moab for the night. Next morning we came back to our raft and continued on up to the mouth of Castle Creek, where we found a 14 or 15-foot row boat. We got in the boat, went back to our raft, transferred our cargo from the raft into the boat, and rowed the boat thus loaded the entire distance back up to the mouth of Castle Creek, except at two rapid stretches of water where we towed it. (R. 5192-6, Vol. 30.) We encountered no navigation difficulties on our downstream trip with the raft or in our upstream trip with the boat, except the work incident to towing the boat at the two places and rowing. I think our boat drew at least a foot of water and would say that at any point in those rapids the water was at least 2 feet deep. (R. 5198-5200, Vol. 30.)

Henry E. Blake testified: In 1909 I went to Green River, Utah, and built a 24-foot boat with a 6-foot

beam, equipped with a 14-horsepower engine and a submerged propeller. That year I made several trips on the Green River with two other men. A. I. Anderson accompanied us down to his ranch on the Green River and no member of the party beside Anderson had ever before made a river trip. We encountered practically no delays on the trip. (R. 5204-7, Vol. 30.) We did no towing on that or any subsequent trip with that boat. We encountered no difficulty on the return journey from Moab. This trip was taken at the crest of the extreme high water. Our traveling time from Moab to the junction was five hours and thence up to Green River, Utah, we made about 5 miles an hour. From the junction up to Moab our running time was about eight hours. (R. 5208-11, Vol. 30.) My next trip was to Townsite Bottom in July. We took down some supplies for Mr. Anderson, also a barrel of gasoline. In September of the same year I made another round trip from Green River, Utah, to Moab. On neither of the last mentioned trips was any trouble encountered except when I landed at one place I ran on to a slight bar. My September trip to Moab was for compensation. In August of that year I constructed another boat which I called the Utah and the September trip to Moab was taken in the Utah. My first boat which I called the Ida B. had a draft of approximately 22 inches and the Utah's draft was 18 inches. On the return trip from Moab in September we brought back 1000 pounds of peaches. (R. 5211-13, Vol. 30.) On the occasion when Mr. Wimmer took a party of Salt Lake business men to Moab, I left Green River, Utah, with twelve or fourteen passengers in my boat, and as I went down the riffle just below the railroad bridge, my view was considerably obstructed and I struck a submerged rock. It required two days for me to repair my boat and I then left with seven or eight passengers and a lot of supplies. Aside from the accident to my boat I had no special trouble or delays on that trip. (R. 5215-17, Vol. 30.). During this period

I took several picnic parties on short trips up the river. (R. 5218, Vol. 30.) In 1910 I started to work at the pumping plant and ceased operating my boats. (R. 5219, Vol. 30.) When I went to Green River I had in mind operating freight boats up to 100 feet in length and with a minimum capacity of a carload and was one of the persons who endeavored to induce the government to improve the navigability of the Green and Colorado Rivers so that we could run those big boats without obstruction. I was unsuccessful in my endeavor to get the government to spend the money. (R. 5222, Vol. 30.)

Albert I. Anderson testified: I first went to Green River, Utah, in 1908. I was then investigating certain oil ground 18 or 20 miles west of Townsite Bottom. Four of us went from Green River, Utah, down to Miller's Canyon at Townsite Bottom with two row boats, each carrying a load of about 900 pounds. The draft of the boat was 10 or 12 inches. We were met at Miller's Canyon with a pack outfit and horses and went thence to the oil ground in which we were interested. (R. 5230-3, Vol. 30.) In March of the next year I made the same trip in a row boat with 100 pounds of supplies. Later I returned upstream to Green River, Utah, with that boat. In April, 1909, I made a trip with Mr. Oppenheimer in the motor boat Paddy Ross down to Sheep Trail, where we met Lieutenant Leeds and his party and we then returned upstream to Green River, Utah. (R. 5234-6, Vol. 30.) I made a trip with Mr. Blake in the Ida B., and on one of my trips with Mr. Blake we towed a row boat behind his motor boat up to Green River. On one trip with Mr. Oppenheimer we took a row boat along with us. On some of Mr. Blake's excursions there were as many as twenty-five or thirty people on his boat; it was so crowded that nothing but heads were sticking out, many small children being on board. In November, 1909, I made a trip from Green River to Moab and return with the Hughes party; we made

this trip in the Paddy Ross boat. (R. 5237-8, Vol. 30.) In 1910 I made another trip in a row boat loaded with supplies from Green River, Utah, to Townsite Bottom. (R. 5239, Vol. 30.) On one occasion I went down to Townsite Bottom in a row boat and came back up to Green River in Ross Wheeler's boat. On another occasion I went from Townsite Bottom to Green River, Utah, in Ed Prothero's boat. (R. 5241-2, Vol. 30.) I made a trip in the Navajo to Tuxedo Bottom, 110 miles below Green River, Utah. In 1914 while the government drilling operation was in progress at the junction of the rivers, the government employed me and my boat, and in it I made several trips to Moab and return with surveyors. I was on the upstream trip when the drilling outfit was taken out. (R. 5242-5, Vol. 30.) I never encountered any difficulties or obstructions to navigation during my experience on the Green and Colorado Rivers. The nearest I ever came to getting stuck on a sand bar was when I made a trip down the river with Messrs. Richardson and LaRue; but we hardly stopped, just touched the bar and went right on. I know of no fact or condition on the Green or Colorado Rivers in those sections with which I am familiar where in operating boats of the character that I have operated and seen operated on those rivers, a man familiar with the river and keeping a reasonable lookout rested under any necessity of encountering obstructions or delays. (R. 5246, Vol. 30.)

William Cooley testified: I am 72 years old and worked for Mr. Branson when he was cutting timber on Castle Creek and Fisher Point. On Castle Creek he cut timber between September, 1897, and May, 1898. I worked for him at Fisher Point in the fall of 1902 for two or three months and in the fall of 1903 and spring of 1904, when I quit his employment. During that period lumber was hauled by wagons to a point about two miles above the mouth of Castle Creek on the Colorado River and rafted thence to

Moab. I accompanied two rafts down the river in 1897, one raft in 1898, one in 1902 and one in 1903. I was a sawyer, and I know that during that period other lumber besides that in the rafts I accompanied was hauled to the river from the saw mill on Castle Creek and later from the saw mill on Fisher Point. Teams would leave with loads of lumber for the river about every other day. (R. 5249-53, Vol. 30.) After I quit Mr. Branson's employ I lived up near Cisco for about four years, and during that period had occasion to drive down to Moab once or twice each year. The road follows the river, and on these trips I passed within 300 feet of the landing where the rafts started down the river. Mr. Branson had a house and corral there and I was very friendly with him and his family and saw them almost every time I passed. In driving down to Moab and returning I would almost always see lumber there at the landing; sometimes there would be twenty or twenty-five thousand feet piled upon the bank there and in varying amounts at other times. On these trips to Moab I stayed overnight at Branson's place at times and saw wagon loads of lumber come down and unload there. (R. 5254-6, Vol. 30.) We encountered no difficulty on any raft trips that I took down the river. When the water was at low stage they would take from ten to fourteen thousand feet on a raft; at a higher stage they would take twenty or twenty-five thousand feet down. These rafts were always in three sections, the aggregate length of which would be from 48 to 54 feet, the length, however, depending on the length of the lumber we had to haul. (R. 5256-7, Vol. 30.) The raft trip down to Moab during the spring high water consumed from 2½ to 3 hours; at low water the trip required as much as ten hours, the water being slower at that time. Two men would accompany a raft. This lumber brought about $22.00 per thousand feet in Moab during the years I worked for Mr. Branson. (R. 5258-9, Vol. 30.)

Dave Johnson testified: I worked on the big barge of the Moab Garage Company for seven months without missing any shifts between December, 1925, and June, 1926. During that period we hauled to the wells of the different companies and tried to average our load so that we would take down about 18 or 20 tons and have hauled as much as 22 tons at one load. On a single trip we have taken 18 or 20 tons of coal down. Virgil Baldwin piloted going downstream and I usually piloted coming upstream. On our upstream trips we would haul bent tools, such as stems and bits that needed repairing, and two or three occasions hauled crude oil. On one of those occasions we brought up 16 barrels of oil, each weighing about 400 or 450 pounds. There was considerable upstream freight. (R. 5260-4, Vol. 30.) In high water we had scarcely any trouble operating the barge either up or downstream and there was not much difficulty with sand bars when going upstream in low water. We frequently traveled on the barge at night and during the time that we were making two round trips every three days we would have to travel late or else camp on the river somewhere. We have left points down the river and started upstream with the intention of tying up on the stream over night and concluding the journey next morning. (R. 5264-7, Vol. 30.) At times we had delays which usually occurred in low water. I would say that on half of our trips the barge was not delayed either in going up or coming down the river because of sand bars or other obstacles to navigation. (R. 5267-8, Vol. 30.) The longest delay I remember encountering at any place while I worked on the barge was not more than two or three hours and I do not recall a single time when we left Moab that we did not reach our destination the same day. On about two occasions we have left a point down the river with the intention of going clear through to Moab that day and failed to do so. (R. 5270, Vol. 30.) Among other freight we transported supplies for cattle outfits and have moved their

camps to different points downstream. Defendant's Exhibit 29 is a picture of the boat when we were carrying some horses. (R. 5271, Vol. 30.) At times the barge would be kept down the river for several days, during which time we would be engaged in boating between different points downstream. At times we would have to remain downstream with parties of geologists or other parties for three or four days; these parties usually took their meals on the boat and used it as headquarters; they would make trips into the country on both sides of the river, come back to the boat that night, and perhaps next morning we would take them to another section at which they desired to land. (R. 5272-3, Vol. 30.) We made trips down to Lockhart, also several trips below No. 2 Well. The river water in no way affected our engine. We used river water in our radiator without any necessity of letting the water settle before putting it in the radiator. We had a tank connected with the radiator and our cooling system was practical and effective. (R. 5274, Vol. 30.)

Issaac W. Stark testified: I am 47 years old and for a time lived in the Green River section. I made a trip with Mr. Wolverton on the Wilmont to Moab and also from his ranch to Green River, Utah, and return. I also made many short row boat trips up and down the stream. When a man is coming upstream in a row boat with his back to the current he will sometimes nose into a sand bar. On my Moab trip in the Wilmont I recall only one instance where we were stuck on a bar, as a result of trying to avoid an eddy. We were some minutes poling off the bar but did not get out of the boat. (R. 5275-8, Vol. 30.) The pictures contained in Defendant's Exhibit No. 31 were taken at different points along the Green and Colorado rivers, between Green River, Utah, and Moab. (R. 5278-82, Vol. 30.)

Knox Patterson testified: I have taken three round trips from Moab to Well No. 1 on the big barge of Moab Garage Company and have also taken two or three trips on smaller boats of that company. I recall no obstacles or difficulties being encountered by the big barge on either of my trips and none were encountered on my trips in the smaller boats of that company. My first trip on the barge was shortly after No. 1 Well blew in, and my other trips were in the succeeding months.

Some time about 1910 or 1911 I went with fishing parties in a power boat, built there at Moab by Merkins. It looked more like a box than a boat, being 15 or 18 feet long and 6 or 8 feet wide. I don't know the horsepower of the engine. On these fishing trips there would be twelve or fifteen people on the boat and we would go down the river six or seven miles below Moab and then come back upstream. We encountered no difficulties with respect to sand bars or other obstacles or obstructions to navigation. I think these trips were taken in August. (R. 5284-7, Vol. 30.)

Hyrum H. Turner testified: I am 79 years old, and have lived in Moab between twenty and thirty years. When I first arrived there I had a few cattle but sold them and came back to Moab and engaged in trapping. I generally used a boat pointed at both ends, and always poled my boats. I have trapped down the Colorado River from Moab to the head of Cataract Canyon from four to six times, bringing my furs back up to Moab in my boat. We never did any towing except when we go tired of poling, and never from necessity except at the Slide, where it was too deep for my pole. On the trapping expeditions I have mentioned I would have a load of six or seven hundred pounds in my boat. (R. 5288-92, Vol. 30.) I have been on ten or fifteen trapping expeditions from Moab down as far as the junction of the rivers, getting mink, fox and coyote furs. I have also trapped beaver on the river for the State of Utah. I have trapped from Moab down to the junction and thence to a point at least 50 miles up the Green River.

(R. 5292-3, Vol. 30.) I have never been bothered with sand bars on any of these trips; there was always a channel, but in poling upstream we would hunt the still water; might strike a sand bar, swing right off, and go on. (R. 5293-4, Vol. 30.) One season I trapped on the Colorado River from the mouth of the Dolores down to Moab, and another year from Westwater to Moab, bringing my camp outfit and furs down with me in my boat on both occasions. I have rafted logs on the Colorado River from a point about 8 miles above Moab down to Moab bridge. (R. 5294-5, Vol. 30.) I worked on the barge of the Moab Garage Company for about six weeks when they first started to operate. We, of course, got on sand bars, which we expect on any river; sometimes we might be held up for on hour, sometimes a little longer, but we were never detained very much or so that we could not make the round trip in two days. The only thing I know of that has ever been done toward improving the navigability of the Colorado River was the shooting out of an ice gorge on one occasion. (R. 5295-8, Vol. 30.) I can go up the Colorado River as far as Cisco in a canoe like my own and have come up in my canoe from the junction without any trouble. (R. 5301-2, Vol. 30.)

George H. Chaffin testified: I am 50 years old, and first went to the Colorado River in March, 1895, and worked on the California bar for about thirty days, the supplies for my party being boated to the bar from the mouth of Hanson Creek. In 1896 or 1897 I again entered the river at Hanson Creek and worked on the Moquie bar, our supplies being boated from the mouth of Hanson Creek to that bar. During that season I made boat trips between Moquie and Tickaboo bar, rowing, poling, sailing and towing upstream. I have sailed up Tickaboo Rapids without aiding my boat, and at other times have aided with my pole. Between Tickaboo and Moquie bars my boat loads were about twelve or fifteen hundred

pounds. In transporting timber we generally used rafts 10 or 12 feet wide and 20 to 24 feet long. (R. 5305-8, Vol. 30.) In 1898 we again worked on the Moquie bar, boating our supplies from Hanson Creek. In April, 1898, I went down the Colorado River from Moquie to Independence bar, also known as Shock bar, located about 15 miles below Hall's Crossing, with a party of eight; we had a boat and a raft and carried with us grain, supplies, machinery and rails. We had about 2500 pounds of load on our 20-foot boat and carried a thousand or fifteen hundred feet of lumber and three or four hundred feet of rails on the raft. We encountered no obstacles or obstructions to navigation and were not hung up on sand bars, rocks, rapids or otherwise. I remained at Shock bar from sixty to ninety days and had occasion to go up and down through Shock rapids. (R. 5309-11, Vol. 30.) In 1899 I again worked on the Moquie bar and made a trip thence to Good Hope bar, sailing and poling the entire distance upstream and did not get out of my boat. I have sailed up Bull Frog, also Smith, rapids without the aid of a pole or without rowing or towing. (R. 5312-13, Vol. 30.) In 1900 I worked on the Moquie bar, also at the Stanton dredge. During each of the years I was on the Colorado, up to and including 1901, I saw other boats besides those of our party in use upon the river and going up and downstream with men and supplies. I went down the river to the Strauss party, about a mile below Hall's Crossing. I rafted lumber from Moquie Canyon to the Stanton dredge, encountering no trouble. About the spring of 1901 I helped Mr. Bennett build a raft and boat, and we took machinery, groceries and grain down to Olympia bar. Later I rafted some timber from the mouth of Tickaboo to Olympia bar. The only difference between rafting in high water and at the lowest stage would be that you would have to build the raft lighter and larger at the lowest stage. (R. 5314-7, Vol. 30.) During the years that I was

on the Colorado I frequently made trips up and down the river, 15 or 20 miles each way from camp, making some trips up as far as Dandy Crossing, which was 35 miles from Moquie bar. While there I worked some of the time for myself, some of the time for Mr. Stanton's company, for the Moquie Mining Company, and for L. M. Chaffin. I have gone down the river below Shock bar and 12 or 15 miles below Lake Canyon but have never observed any ledge of rock in that section extending clear across the river. There is a channel through the ledge located near Lake Canyon, which channel is about 40 feet wide. (R. 5318-21, Vol. 30.) I have been on the river below Hite in every month of the year except August. In poling I have had opportunity to observe depths of water, and I know of no difficulty or obstacle that would prevent or make difficult the navigation, either up or downstream, of that portion of the river over which I have done boating with a boat drawing two feet of water. Most of the boats I saw there were made by the miners who were working on the bars. Supplies came to the river overland. (R. 5321-6, Vol. 30.)

Edward T. Wolverton testified: I am 67 years old, and went to Green River, Utah, in 1900. (R. 5327, Vol. 30.) In 1900 I made a round trip from Wimmer's Ranch to the junction of the rivers in a row boat having a draft of about 9 inches. This was in February, at a very low stage of water, and the minimum depth I found in the channel was two feet. The same year I made a round trip from my ranch to Green River, Utah, towing the boat up the riffles and rowing it the remainder of the distance. Next year we built an 18-foot row boat, with a 3-foot beam; we successfully sailed that boat upstream, and its draft as loaded was about two feet. (R. 5331-3, Vol. 30.) In 1903 I built the Wilmont, which was slightly over 27 feet long, with a 5½-foot beam. Its draft empty was about 10 inches, and with loads its draft

was up to 3 feet. It was a stern wheeler and at first was equipped with a four-horse power engine. With that engine I couldn't go up the riffles between my ranch and Green River without assisting the boat, but with it I made two round trips to the junction of the rivers and one round trip to Moab. We had very little trouble on those trips but the engine didn't have enough power. (R. 5333-5, Vol. 30.) Both of the above mentioned trips to the junction in the Wilmont were for compensation. (R. 5337, Vol. 30.) The next year I installed a 7½ horsepower engine in the Wilmont and changed it from a stern to side wheeler. After this change I made one round trip to Moab on personal business and another round trip there with tourists for compensation. I also made several round trips from my ranch to Green River, Utah, and had no difficulty in negotiating the riffles. I had no difficulty with the current on making progress on either of the Moab trips. (R. 5338, Vol. 30.) In 1903 and 4 we carried in the Wilmont considerable supplies from Green River, Utah, to my ranch, and from my ranch to a point 25 miles below, where the Utah-Nevada Copper Company was operating a low-grade copper property. We carried lumber and all sorts of supplies for the use of that company. (R. 5341-2, Vol. 30.) We later built two scows for hauling copper ore, the largest being 30 feet long with a 12-foot beam and the smaller one 20 feet long with an 8-foot beam. I then installed a 14 horse power engine in the Wilmont. I hauled several tons of copper ore in the Wilmont to Green River, Utah, but I am not sure whether or not we took any scow loads of ore up to town. (R. 5345, Vol. 30.) I made several round trips to Moab and to the head of Cataract Canyon after installing the 14 horse power engine in the Wilmont, all of which trips were for compensation. In 1905 or 1906 the copper company built another power boat called the Colorado, in which we used my old 7½ horse power engine. I recall making a number of trips in the Colorado, generally to

the head of Stillwater Canyon, but that boat was not a success. In 1906 the copper company quit operating. During the years 1905, 1906 and 1907 I made other trips than those I have mentioned here for compensation. I took one party of hunters in the Colorado 40 miles down the Green River and made a number of trips with tourists and hunters on the Wilmont. All of these trips were for compensation. I frequently took a scow loaded with supplies down to Townsite Bottoms. We would leave the scow there as a sort of supply base and continue with the party to the head of the cataracts with my power boat, returning to the scow and getting more supplies as they were needed. In handling the scows that I have mentioned in my testimony we would always push them with the power boat. (R. 5346-9, Vol. 30.) After the winter of 1907-8 or 1908-9, when the ice ran out in the spring, the Wilmont was caught and its hull so damaged that I removed the machinery and built a 22-foot boat with a 5-foot beam and a draft empty of 18 inches, and with loads of draft up to 3 feet. In this boat I installed my old 7½ horsepower engine. This was a propeller boat and was named the Navajo. Between 1908 and 1912 we used the Navajo for carrying hunting parties and tourist parties to the cataracts and to points on the Colorado River above the junction. At one time I took the City Engineer of Salt Lake City and some other men from Green River, Utah, to Moab and return in the Navajo. I took several other trips with the Navajo from Green River, Utah, to points near Moab, not going clear into Moab because these were hunting parties and our objective was hunting ground. On these trips we took all of our supplies along with us in the boat and all of these trips were for compensation. During those years I took supplies for compensation to persons at Townsite Bottoms. I frequently towed row boats loaded with supplies. I kept the Navajo in operation during those years for the profit there was in navigating the river and couldn't

afford to take pleasure trips. I lived at my ranch all the year round and brought most of my supplies down the river from town in my boat, each year making many round trips. (R. 5349-53, Vol. 30.) After I took the four-horse power engine out of the Wilmont I had no trouble in negotiating any portion of the Green or Colorado river with that boat. At times during the first few years we touched sand bars but were off and on again without any serious difficulty; I don't think we were ever on a sand bar with the Wilmont more than three minutes. The only difficulty I ever encountered in operating the Navajo was when there was a sand roll in the stream and the waves would cause water containing sand to get in the water jacket. Aside from that engine trouble, I recall no other difficulty of any character that we encountered during the years I was navigating with the Navajo. I have never been capsized by one of these waves and never knew of any one else being capsized, and I run those waves head on. When there is a flood driftwood appears on the river, but not at other times. Driftwood damaged my paddles when I was operating with a side wheel. Driftwood usually follows the main channel and you can dodge to one side of it. It never kept me off the river. (R. 5353-6, Vol. 30.) I have never found any great change in the channel of the Green or Colorado river between Green River, Utah, and Moab, except that when a flood came in from a side wash it would be hard to find a channel for a few hours. There was always a channel if you knew where to find it. Where there is a fall of 2.8 feet per mile the current is sufficient to wash away material brought in through side canyons within a few hours; at other points it may take a day or two for the channel to be cleaned again and back in its former condition. What I have just said holds true in Stillwater and in Labyrinth Canyon. After you have made your first trip through a place where material has been washed in from a side canyon you have no difficulty in finding the channel

there on later trips, but you have to keep a sharp lookout. Usually the channel is well-defined and there are surface indications of its location. (R. 5356-9, Vol. 30.) Knowledge of the Green and Colorado rivers and boating experience upon them are very valuable aids in navigating those streams. (R. 5363, Vol. 30.) Eleven photographs marked "Defendant's Exhibits Nos. 32 to 32-J," both inclusive, are pictures along the stretches of water concerning which I have testified and of various boats and points of interest. One of them—Exhibit 32-C—is a picture of the Wilmont pushing a scow loaded with several tons of copper ore. (R. 5367-72, Vol. 30.) It is my conclusion that the Cliff Dwellers certainly made use of the river because their store houses are often placed in a canyon where there is no other method of approach and at points absolutely inaccessible except to boats on the river. At those points there are marks, or foot holds, up and down the canyon walls from their houses to the river. (R. 5374, Vol. 30.) I ceased carrying freight and passengers late in 1912 because I couldn't make it pay; by that I mean that we did not receive money that we considered compensation for our investment and the effort involved; with the boats that we had and could afford to build we couldn't compete commercially with the short haul, for instance, from Green River to Moab. We spent no money for advertising or otherwise to attract tourists and had no capital for any such purpose. (R. 5387-9, Vol. 31.) I once came down the Green River in the Navajo with quite a heavy load on the occasion when the Valley City reservoir had gone out and the water in the stream had backed up fully 12 miles. When I returned two days later there was no sign of any debris in the river, which had cleaned itself out in the meantime. On another occasion when a flood came down Indian Creek the water backed up for five or six miles; however, there was a good channel on the west side and we went right through without any trouble. The two instances I have mentioned

are the only instances I know of when either of the rivers were backed up. (R. 5391-3, Vol. 31.) In 1910 I saw a fall of many thousands of tons of rock at a point 10 or 12 miles below Green River, Utah, and I also saw a large fall of rock just below the junction; the occasion I first mentioned is the only occasion I know of when rock fell into the river; I don't think rock fell into the river on the other occasion, just below the junction. (R. 5418, Vol. 31.)

George H. Dern, Governor of Utah, testified: In April, 1926, I made a boat trip with Dave Rust and party from the mouth of Crescent Wash to Lees Ferry. I do not recall our encountering any sand bars or being delayed by sand bars on that trip and I observed no other difficulties or impediments to navigation on that stretch of water. A few days earlier I went from Moab to Shafer No. 1 Well on the Moab Garage Company barge and returned upstream the same afternoon on the smaller power boat. We encountered no delay or obstruction on either the down or upstream journey, everything going smoothly. (R. 5379-82, Vol. 31.) I have lived in Utah for 35 years, and for a considerable period I was a state senator, and since statehood have kept in intimate touch with the public affairs of Utah. I know of no work ever having been done by the state or by the federal government or any other agency in improving navigation on either the Green, Colorado or San Juan rivers. (R. 5384, Vol. 31.)

Henry C. Tasker testified: I am 35 years old, and lived at Green River, Utah, between 1911 and 1928. In July or August, 1912, I made a motor boat trip with Mr. Wolverton to Townsite bottom for the purpose of looking over the country for use in the cattle business. My father paid Mr. Wolverton for this trip. We encountered no difficulties and got on no sand bars. (R. 5434-8, Vol. 31.) We maintained a camp at Townsite bottom for about three years, dur-

ing which time I made another motor boat trip with Mr. A. I. Anderson with a boat load of supplies. Mr. Anderson was paid for the services rendered by him and his boat. During that period I borrowed a boat from Mr. Wheeler at his ranch five miles below Green River, Utah, and took supplies down to our camp in that boat and then rowed and poled the boat back upstream to the Wheeler Ranch. I recall encountering no sand bars or other difficulties on the downstream trip with Wheeler boat but going back upstream I got on a sand bar when attempting to take a short cut across a bend. On the motor boat trip with Mr. Anderson I don't remember encountering any sand bars. (R. 5438-40, Vol. 31.)

In 1921 I was with the Chenoeweth party on the survey that began at the junction of the Green and Colorado rivers. I started from Green River, Utah, with Messrs. LaRue and Page before the rest of the party. The three of us rowed in an 18-foot boat to the junction of the rivers. We left Green River about September 15th and after finishing our survey work arrived at Lees Ferry in December, 1921. (R. 5441-3, Vol. 31.) In making the topographic survey on which we were engaged I and the other rod man would take positions at designated points; sometimes one man was used on one side of the river and one on the other side; at other times we would criss-cross back and forth; most of the time each of the rod men had a boat and we would go from point to point in our boats. Sometimes when I didn't have a boat I have walked out into the river as far as I could wade and would swim the rest of the way. There were no sand bars in Cataract Canyon. From the foot of Cataract Canyon down to the Utah-Arizona line our boats were frequently stuck on sand bars and between Green River and the junction my boat would, of course, get stuck on a sand bar on the occasions when we landed. In going down the Green River, when we were traveling straight down the river with no intention of stopping, we struck no sand bars, but when

landing we would hit a bar. I do not recall a single instance of striking a sand bar between Green River, Utah, and the head of Cataract Canyon except when we had deliberately left the channel of the river. (R. 5443-7, Vol, 31.). Between the foot of Cataract Canyon and the Utah-Arizona line we were frequently stuck on sand bars, as were other boats being used by members of the survey party. If the chief would tell you to go and give him a shot from a certain point and you started to go over there you might get stuck on a bar; then he would come down to where you were and would possibly send the other rod man to the other side of the river and in going to the designated point the other man might or might not get stuck; it would all depend on where the channel was. Many times we could go right to the place we were sent without any difficulty, but at other times we would have to get out and wade. So far as I recall, my boat never got stuck on a sand bar or hit a sand bar on the entire stretch of the Colorado River, from the foot of Cataract Canyon to the Utah-Arizona line, while it was in the channel of the river, or at any time when I had not deliberately left what I knew to be the channel of the stream. I never saw any boat of any other member of our party get stuck on a sand bar while it was in the channel of the river. (R. 5447-9, Vol. 31.)

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Clerk

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No. 14, Original

In the Supreme Court of the United States

OCTOBER TERM, 1930

THE UNITED STATES OF AMERICA, PLAINTIFF

v.

THE STATE OF UTAH, DEFENDANT

PROPOSED FORM OF DECREE

In the Supreme Court of the United States

OCTOBER TERM, 1930

NO. 14, ORIGINAL

THE UNITED STATES OF AMERICA, PLAINTIFF

v.

THE STATE OF UTAH, DEFENDANT

The United States of America, plaintiff herein, herewith submits a form of decree carrying into effect the conclusions announced in the opinion of the Court delivered on the 13th day of April, 1931.

Respectfully submitted.

THOMAS D. THACHER,
Solicitor General.
CHARLES M. BLACKMAR,
Special Assistant to the Attorney General.
SAMUEL H. MOYER,
RANDOLPH S. COLLINS,
Attorneys.

The form of decree is approved by the State of Utah.

GEORGE P. PARKER,
Attorney General of the State of Utah.
WALDEMAR VAN COTT.
GEORGE D. PARKINSON.
WILLIAM A. HILTON.
P. T. FARNSWORTH, Jr.

56536—31

DECREE

This cause came on to be heard by this Court, upon the exceptions of the parties hereto, to the report of the Special Master.

Now, therefore, for the purpose of carrying into effect the conclusions of the Court, as stated in its opinion, dated April 13, 1931, IT IS ORDERED, ADJUDGED, AND DECREED that:

1. The Bill of Complaint, in so far as it relates to the Green River, is dismissed. The Green River, from a point where the river crosses the township line between townships 23 and 24 South, Range 17 East, Salt Lake Base and Meridian, to the confluence of the Grand (Colorado) River, is now and at all times on and after January 4, 1896, has been, a navigable river, and the title to the bed thereof vested in the State of Utah upon its admission into the Union on January 4, 1896, except so far as the United States of America may theretofore have made grants thereof. The United States of America is forever enjoined from asserting any estate, right, title, or interest in and to said river bed, or any part thereof, adverse to the State of Utah, or its grantees; and from in any manner disturbing or interfering with the possession, use, and enjoyment thereof by the State of Utah, or its grantees.

2. The Bill of Complaint, in so far as it relates to the Grand (Colorado) River, is dismissed. The Grand (Colorado) River, from a point located at the mouth of Castle Creek to the confluence of the Grand (Colorado) River with the Green River, is now and at all times on and after January 4, 1896, has been, a navigable stream, and title to the bed thereof vested in the State of Utah upon its admission into the Union on January 4, 1896, except so far as the United States of America may theretofore have made grants thereof. The United States of America is forever enjoined from asserting any estate, right, title, or interest in and to said river bed, or any part thereof, adverse to the State of Utah or its grantees, and from in any manner disturbing or interfering with the possession, use, and enjoyment thereof by the State of Utah or its grantees.

3. The Bill of Complaint, so far as it relates to the Colorado River, from the confluence of the Green River and the Grand (Colorado) River to Mile 212.15 above Lees Ferry, Arizona, and from Mile 176 above Lees Ferry, Arizona, to the Utah-Arizona Boundary Line, is dismissed. Said stretches of said river and each of them are now and at all times on and after January 4, 1896, have been navigable, and title to the beds of said last-mentioned stretches of river and each of them vested in the State of Utah upon its admission into the Union on January 4, 1896, except so far as the United States of America may theretofore have

made grants thereof. The United States of America is forever enjoined from asserting any estate, right, title, or interest in and to said beds of said last-mentioned stretches of river or in or to any portion of said last-mentioned beds, or either of them, adverse to the State of Utah or its grantees, and from in any manner disturbing or interfering with the possession, use, and enjoyment thereof by the State of Utah or its grantees.

4. The Colorado River from Mile 212.15 above Lees Ferry, Arizona, to Mile 176 above Lees Ferry, Arizona, is not a navigable river and the title to the bed of said last mentioned stretch of river is vested in the United States of America, except as to lands heretofore granted, and the State of Utah is forever enjoined from asserting any estate, right, title, or interest in and to said bed of said last mentioned stretch of river or in and to any part of said last mentioned bed, adverse to the United States of America, or its grantees; and from in any manner disturbing or interfering with the possession, use, and enjoyment thereof, by the United States of America, or its grantees.

5. The San Juan River, from the mouth of Chinle Creek to the confluence of the San Juan and Colorado Rivers, is not a navigable river, and the title to the river bed is vested in the United States of America, except as to lands heretofore granted, and the State of Utah is forever enjoined from asserting any estate, right, title, or interest in and to said river bed, or any part thereof, adverse to

the United States of America, or its grantees; and from in any manner disturbing or interfering with the possession, use, and enjoyment thereof, by the United States of America, or its grantees.

6. The United States of America shall in nowise be prevented from taking any such action in relation to said rivers, or any of them, as may be necessary to protect and preserve the navigability of any navigable waters of the United States of America.

7. It is further adjudged and decreed by the Court that each party hereto pay its own costs and that each party hereto pay one-half of the expenses incurred by the Special Master, and also one-half of the amount to be fixed by the Court as the compensation of the Special Master.

U. S. GOVERNMENT PRINTING OFFICE: 1931